

COAL AGE

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No. 5

The Question

BY BERTON BRALEY

Written expressly for Coal Age.

What have you done with the old men
Who're broken by toil and time?
Once they were brave and bold men,
Now they are past their prime,
Now they are aged and juiceless,
Now that their race is run,
Now that they're weak and useless,
Tell us: What have you done?

Have you made their hard lives rougher
By turning them out, in truth,
To shiver and starve and suffer
In the world that was meant for Youth?
Now that they cannot aid you
Nor earn their miner's wage,
For all that their work has paid you,
How have you dealt with Age?

Once they were young and gay men
Toiling to make you wealth,
Now they are bent and gray men
Broken in strength and health,
Have you pensioned these one-time bold men
Or starved them as some men do?
As you have dealt with the Old Men
May Destiny deal with you!

It Is Better to Eliminate a Wrong Than to Alleviate the Evil Consequences

Yes, Mr. Superintendent, the Christmas and New Year season is past and you have again settled down to your ordinary way of doing things. Probably by now that feeling of benevolence stirred up in you by the sound of Christmas bells has passed away, or is rapidly disappearing. You have probably helped charities both worthy and unworthy during the past month.

Maybe you gave John Brown's orphans a dollar apiece and provided them with a few toys; also, if the feeling was strong upon you, you saw that they had their Christmas dinner.

Perhaps you also assisted Bill Thompson's children whose sufferings were caused by Bill's foolish desire for drink. What a time you had at the Christmas tree! and how glad you were to see parents and children all happy.

You did feel sorry for Henry Williams and his wife who were there, but all alone, the sweet little boy and girl they were blessed with having been snatched away from them by the "Grim Reaper," during the epidemic of fever which swept the camp last spring. But while you in your benevolence attempted to alleviate some of the misery around you, did you pause to think of what had actually caused some of it?

Maybe if you sit down now and consider, you will discover that your mite just expended in the cause of charity did not compensate for your being responsible for much of the misery which aroused your sympathy.

Had you paid more attention to the various "Safety Movements" and not displayed such criminal indifference to the social conditions of your workmen, perhaps some of the misery which touched your pity would not have existed.

PERHAPS YOU ARE RESPONSIBLE FOR MUCH MISERY

You are probably indirectly responsible for the conditions of some of those poor sufferers.

Why did you not have some of your men trained in first-aid work? Then John Brown would not have died from arterial bleeding, for his wounds would have been instantly attended to. And maybe William Thomas, whom we omitted to mention before, would have had two legs instead of only one, if he had not been roughly and unskillfully handled by untrained men.

In both cases the children depending on these men would have been able to enjoy more luxuries than they did, even without your paltry dollar or two.

You also maintain a very nice (?) saloon in your camp, and while the houses you provided for your workmen were as plainly and poorly built as possible, this same liquor emporium is fitted up with all the modern attractions of such abodes of corruption. The human desire for things better than we ourselves possess probably attracted Bill Thomson first to such a place, hence his downfall.

Your camp is in a bad sanitary condition and has been so for some considerable time. You know this is true, and you also know the reason for the outbreak of fever which took away Mr. and Mrs. Henry Williams' children. However, you excuse yourself on the plea of "saving expenses."

WHY DO YOU NOT TAKE AN INTEREST?

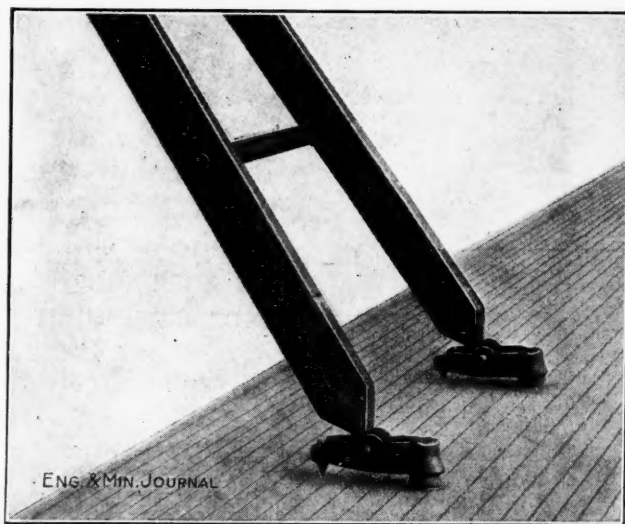
Why do you not take an interest in the safety-first movements and maintain efficiently trained corps with all the necessary appliances? Why do you not take an interest in the social welfare of your workmen and keep your camp in good shape? Also, why do you not assist the promotion of such societies as the Y. M. C. A. in your camp? Surely it cannot be that you have no time to consider anything other than the making of a few paltry dollars to improve your reputation for cheapness of production, regardless of the fact that you are gambling away human lives.

If low cost of production is your only thought, it is time you were eliminated. Get down to business and remember there are more days than Christmas Day and New Year's Day to do good.

Pay a little more attention to the human element and then you will be fit to hand out a dollar along with a Christmas blessing to a worthy cause. If you are responsible for so many miseries, due entirely to your indifference and negligence, you are as guilty of murder as if you had deliberately shot your victims.

Safety Ladder Feet for Concrete and Iron Floors

Often a ladder equipped with sharp-pointed or spiked feet will slip on a concrete or iron floor, though holding perfectly in a wooden one. To provide ladder feet that will hold under any conditions, the Eastman Kodak Co.



SAFETY FEET FOR LADDER

has designed the style shown in the illustration, taken from the *American Machinist*. This consists of castings hinged to the ladder legs as shown. Each casting carries a spike at one end and a rubber pad at the other. The spike will hold on wood or dirt surfaces, and the rubber on surfaces where the spikes would slip; the two make an ideal combination that needs no adjusting when setting the ladder. The spikes used are threaded horseshoe calks of a type easily purchased in the open market, and the rubber pads are standard large-size crutch tips.

The number of ladder accidents have caused much ingenuity to be displayed in their reduction. The American

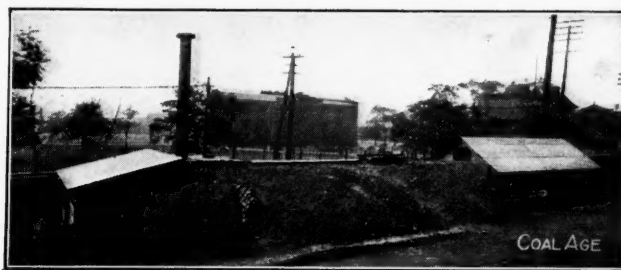
Mason Safety Tread Co., of Lowell, Mass., is using carborundum grains set in delta metal casings for ladder footings. The carborundum retains its edges and even when the false ladder foot becomes coated with oil or grease, it still retains reliable nonslipping qualities.

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Mine Fires on an Experimental Scale

The Bureau of Mines has recently installed at its Pittsburgh experiment station an underground chamber or furnace in which to carry on experiments relating to mine fires and spontaneous combustion as occurring in mines.

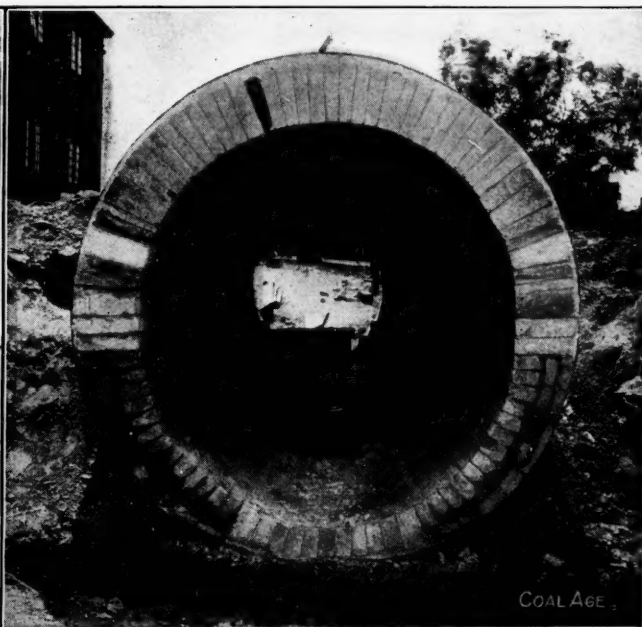
A section of steel tube, cylindrical in shape, 6½ ft. in diameter and 27 ft. long, was laid on its side in a trench. After lining with firebrick and mineral wool and stopping the ends with 13-in. brick walls, this shell was covered with two feet of earth. The chamber was constructed so as to be as nearly airtight as possible, and in such manner as to retain to the greatest degree practical any heat generated within its walls.



GENERAL VIEW OF PLANT

The progressive changes in composition of the fire gases or of the air surrounding the coal will be followed and temperature measurements made, in an endeavor to apply the data thus obtained to solving practical problems in the treatment of mine fires.

Investigations have been made in other countries and to some extent also here, on the gases produced in actual cases of mine fires both before and after sealing off a burning area. The bureau is now making, however, probably the first attempt to investigate such problems in an



THE STEEL CYLINDER LINED WITH FIREBRICK AND WITH END BRICKED IN

At one end a motor-driven fan will blow in air at a rate which can be accurately measured, and at the other a stack is provided which can be opened or closed as desired. Through the top of the chamber, at frequent intervals, pass small pipes for withdrawing samples of air or gases and for inserting pyrometers for temperature measurement in the interior.

COAL AND WASTE MATERIAL WILL BE SCIENTIFICALLY TESTED

The chamber will hold 6 to 8 tons of coal when one-third full. It is expected that different kinds of coal or of the gob or waste material from mines will be placed in the chamber and a study made of the spontaneous development of heat in them under various conditions. After an active fire has been started either by this means or artificially, experiments will be made on controlling it by reducing the air supply or by sealing it off entirely.

experimental apparatus which permits careful control of conditions and yet is on a scale nearly commensurate with mining operations. These experiments are being carried on by Horace C. Porter, chemist, of the Bureau of Mines.

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Messrs. Fletcher, Burrows & Co., colliery proprietors, of Atherton, England, have just completed the erection of a lofty and spacious building containing 40 spray baths for the use of the 700 colliers employed at their Gifffield pit. The water for the baths is supplied from a large tank inside the building capable of holding 500 gal. of water. The collier, after taking off his pit clothes, goes into one of the small recesses, and pressing on a piece of wood with his foot causes the water to come over him in the form of a spray at a temperature of 96 deg. Seven minutes are allowed for the bath, and the collier has to bring his own soap and towel. After rubbing himself down, he can put on his clean walking clothes, which have been slung up to the ceiling, and if they have been in the rain, will be quite dry by the time he needs them. There are 396 of these slings, each numbered and provided with a separate lock and key.

A Wireless System of Telephony for Coal Mines

SPECIAL CORRESPONDENCE

SYNOPSIS—Reineke's wireless-telephone system dispenses with all connecting wires and has been used successfully for two years in a Westphalian colliery. It can be readily moved from one place to another and is not affected by other electric currents. No sparks can be produced.

The liability of the connecting wires in ordinary mine-telephone systems to become damaged and broken by the

Means, however, of dispensing with connecting wires have been developed by Reineke's Wireless Telephones, Ltd., of London, and Herr Reineke's system has been in regular use for two years in the Carolinengluck mine, at Bochum, in Westphalia, Germany. No other system of signaling is now used. Since then it has been applied in Great Britain at the Dinnington Main colliery, and Fig. 1 shows the manager of this colliery at the receiving and transmitting station in his office underground. The sec-



FIG. 1. COLLIERY MANAGER AT WIRELESS PHONE IN UNDERGROUND OFFICE



FIG. 2. ENGINEER IN PIT CAGE RECEIVING MESSAGE FROM SHAFT BOTTOM

work going on in the colliery has always been a source of trouble, and, from time to time, attempts have been made to provide a satisfactory substitute to the ordinary telephone service, or to so improve such service as to make it absolutely beyond suspicion in the above respect. With the advent of wireless or spark telegraphy for ordinary above-ground work, it was confidently hoped that developments would shortly occur in connection with the application of the same means of transmitting electrical impulses and telephony in mines, but there are certain disadvantages with regard to spark telephony which make it difficult of application to this purpose.

ond illustration shows the engineer of the colliery in the pit cage receiving a message from the pit bottom.

RAILS AND PIPES ACT AS CONDUCTORS

In the Reineke telephone, transmission and reception of the speech in the telephone occur exactly as in an ordinary telephone; that is to say, the current strength is varied by the sound waves causing the diaphragm in the transmitter to vibrate, and so vary the resistance offered to the current by the carbon particles in the telephone. This varying current operates the diaphragm of the receiver through the agency of the magnet excited

by the currents. Instead, however, of the current from the transmitter being conducted along wires to the receiver, it is converted to a high pressure by a transformer contained in the telephone case and the high pressure or secondary winding of the transformer is connected to the ordinary rails or pipes in the pit.

In this way, the charge of electricity is communicated in and spreads over the whole system of rails throughout the pit, the charge varying with the fluctuations of the primary current in the transmitter circuit of the telephone. In this system no attempt whatever is made to insulate the rails or pipes or to connect the adjacent lengths electrically. The conditions of distribution of electric charges underground are entirely distinct from the conditions on the surface of the earth and the working of the system largely depends on this fact which was for the first time demonstrated by Herr Reineke.

The reception of speech is accomplished by connecting telephones to the rails or pipes at any point of the system, by bridging a sufficient length to obtain a suitable potential difference, or by connecting between the rails and pipes if these exist, while in some cases it is found convenient, as in portable instruments, to connect to an antenna consisting of a loose coil of wire which may be laid on the floor or hung on the timbers.

A BELL RINGS JUST AS IN AN ORDINARY TELEPHONE

To call attention, a bell similar to that of the ordinary telephone is operated by a specially designed relay. When the button is pressed at the transmitting station, all the bells belonging to the receivers will ring and all the telephones will receive the message by taking the receiver off the hook, which cuts off the bell and connects up in the usual manner.

By tuning the relays, it is possible to make each respond to its own particular signal so as to call any one station, but in mining work this does not appear to be either necessary or desirable, and the different stations are called up by giving one, two or three rings, a special signal calling all the stations to speak simultaneously. The current is given by an ordinary battery, and in outward appearance the telephones are similar to the ordinary mine telephone.

One form of the instrument is exceedingly portable, weighing with its case about 20 lb., enabling it to be carried about and used in any part of the pit to which the rails extend. It can either ring up other stations or be rung up by them. A smaller or pocket instrument can also be made which can ring up other stations, but cannot be called by them, but messages can be exchanged from any of the fixed telephones. This is useful for an overseer, who thus can give notice of any accident and ask for assistance from any point whatever in the pit.

A telephone can be fixed at any position on the surface and connected to the head gear if desired, or to the winding rope or pipes which go down the shaft. This telephone can speak to any of the telephones underground if necessary, but it is usually found convenient to enable it to speak to the station at the pit bottom only and for this station in turn to deal with the underground telephones. In metalliferous mines which have a number of different levels running from one shaft, communication from one level to the other is established without the presence of ore affecting the speech in any way.

CAN SPEAK FROM A MOVING CAGE

A special application is the speaking from the moving cage to the winding-engine house. For this purpose the telephone is mounted on a standard which brings it close to the engineman's ear. On receiving a call he has only to put his ear to the receiver, the slightest pressure being sufficient to switch in the telephone and allow him to communicate with the cage without lifting his hands from the levers.

For the telephone in the cage, one of the best methods of connection is the connection into a loop formed by the winding ropes and by the balance rope, or if this is not used, by a wire suspended below the cage in the same way. It is then possible to speak from the cage either to the surface or pit bottom without any alteration to the ordinary winding arrangements. The surface telephone is preferably connected in circuit with a loop of wire, which is fixed to the headstocks or in the shaft in any convenient place.

SYSTEM IS ABSOLUTELY SAFE

We are indebted for this information to the Reineke Wireless Telephones, Ltd., and also to a paper before the Institute of Mining Engineers, by T. W. Wallis, at a visit to the Astley Green colliery, Manchester, England. The system appears to provide numerous advantages. It is claimed to be absolutely safe because there is no possibility of producing a spark under any conditions. It provides complete certainty of communication as there are no connecting wires to be interrupted. It can easily be moved from one place to another if required and it cannot be affected by, or affect other electric circuits in its neighborhood, whether these are direct or alternating currents conveying power, or used for signaling. Moreover, it is not interfered with by ordinary wireless telegraphic signals. The system therefore appears to have a great future and opens up quite a new phase in the problem of underground telephony.

Consular Market Notes

The U. S. Consular service makes the following comments on the foreign markets:

Silesia—There was a lively and continuous demand during the year for Silesian coal, especially for industrial purposes, in Germany, Russia and Austria-Hungary. The mining strike in England made German, Danish, Swedish and Russian customers buy from Silesia, and the strike in the Ruhr district in Germany increased the demand. As the river conditions were unusually good, the only complaint heard was of the car shortage, which was worse than ever, especially in this district. This shortage begins every year in the middle of September and ends in November with the close of the sugar-beet harvest.

The production of stone coal in the province for the past three years in metric tons (metric ton = 2204.6 lb.), was 39,993,239 in 1910, 42,300,412 tons in 1911 and 47,445,170 tons in 1912.

Australia—Export statistics of Newcastle for the first nine months of 1913 show gratifying trade increases over the similar period last year. Coal shipments totaled 3,786,432 tons, valued at \$9,645,727, increases of 166,756 tons and \$490,625, respectively. It is announced that a contract for supplying 100,000 tons to Java has been obtained for Newcastle.

Gibraltar—Coal trade of this port has increased during the last few years, and further development is looked for in 1913. In 1912 the total number of steamers calling for coal was 2010, and 229,051 tons were sold, an increase of 180 steamers and 7916 tons over the previous year. The current price for Welsh coal is \$7.17 and North Country \$6.32 per ton f.o.b. No American coal has yet reached this market.

Belgium—In 1912, 5,784,850 tons of coal were sold in the Liege consular district. As compared with 1911, the amount of coal sold increased 455,950 tons, or 8.6 per cent. The total increase in value of the coal output was \$3,218,305, the increase in price per ton being 36c. for semihard, 28c. for hard, and 19c. for soft coal. The net profits of the coal mines amounted to \$1,682,168, or an increase of \$751,994 over 1911.

The coal market showed great strength in 1912, especially in coal for industrial use. Coal for household use was not in great demand, on account of the exceptionally mild winter. One result of the firmness of the market was an increase in the price of coal.

An Analysis of the Ohio Mining Commission's Report

BY A. T. SHURICK

SYNOPSIS—*The second and concluding article on the Ohio Mining Commission's report. The arguments of both the miners and operators, for and against the proposed new legislation, are discussed in detail. The main contention of the miners appears to be founded on an intangible psychological condition. The commission finds that the impurities in the finer sizes will be so increased under the screened-coal system that they will be practically worthless unless washed. Although the operators' arguments are sustained by the commission itself, in nearly every instance, the recommendations are made in favor of the miners. The report makes the incongruous blunder of condemning without attempting to prescribe a remedy.*

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The report next enters into a detailed analysis of the arguments of both parties to the controversy.

The First Objection of the miners is that on the present basis of payment they are "not paid for the whole product of their labor." The commission is of the opinion that while this "will not bear analysis, it is probably true that this assumed grievance is the most serious defect in the present system of wage payment." Obviously it is a psychological effect, a condition of the mind, rather than a real, tangible grievance. Even the old, original report of 1883 pointed out: "The stubbornness of this misconception is hard to overstate." But it is none the less based upon such absurd contentions, that it would hardly seem to justify the consideration of serious men of affairs. For these rather illogical reasons, the commission shows a tendency to agree with the miners in their position.

A more tangible reason for sustaining this objection would seem to lie in the loss of fine coal, as is pointed out in the report. Under the present system of payment the miners do not benefit by loading out the smaller sizes, so that a certain proportion of these must be lost to posterity. But even this loss is so small that it cannot be considered important when compared with the average mining practice throughout the country.

It is generally true, however, as the report ultimately sums up, that since "the miners believe that they are not being paid for a portion of the product of their labors, and that this results in grievances, causes of disputes and bitter feeling between miners and operators," it is obviously desirable to effect an agreement providing it can be conclusively shown that no material injury will result to either party.

INACCURACIES OF THE SCREEN-COAL BASIS

The Second Objection of the miners is that the percentage of lump coal is fixed in a more or less arbitrary manner. If, as the commission states, the amount of screenings made at the different mines varies between such extremes as 5 to 45 per cent., this certainly is one of the "strongest arguments against the present system." Not only do the operators generally benefit over the miners, but companies in different districts have a certain economic advantage over those in others. The commission

is uncertain as to how much weight should be given to this objection, because, "under any system of collective bargaining, inequalities are bound to exist," but surely there is little excuse for a discrepancy of such proportions as this. It is not by any means an unusual practice to fix the wage scale according to the varying conditions in the different districts, and it seems that a satisfactory solution to this difficulty might be effected in this manner.

The Third Objection of the miners to the screen-coal basis of payment is that: "It is to the interest of the operators at some mines to produce a large amount of fine coal," and a number of methods of roughly handling the coal in order to obtain this end are cited. It is true that a mine may occasionally (though very rarely) find it necessary to crush a portion of its output in order to meet a temporary heavy demand for slack coal. On the other hand, this might have been readily purchased in the open market, and the differential in value between the two saved. Indeed conditions where the operator could profit by increasing his proportion of slack, so seldom occur in the commercial end of the industry that to all practical purposes this contention of the miners can be ignored.

DISCREPANCIES IN THE PROPORTION OF SCREENINGS

The Fourth Objection of the miners charges either deliberate negligence or a studied unfairness on the part of the operators in screening the coal. It is claimed that while the companies usually comply with that part of the agreement providing for screen bars spaced $1\frac{1}{4}$ in. apart, these wear away rapidly, permitting a greater amount of coal to pass through than should. If the findings of the commission are to be given full credence, the operators have been exceedingly lax in this respect and should be taken sharply to task. The commission states that it took measurements of the screens at all the mines visited and that it was *seldom* that one was found fulfilling the prescribed conditions.

Of course, there are extenuating circumstances in this connection, since it might be said that after the first day's use the screens may be sufficiently worn to make an infinitesimal discrepancy. Obviously the operators should not be required to replace such a screen, and in fact it becomes a question as to just what variations from the $1\frac{1}{4}$ -in. spacing should be permissible. It is clearly a strain upon the integrity of any operator to require him to purchase new screen bars when such expenditure works to his disadvantage. It is, therefore, not to be wondered that the miners have experienced exasperating delays in prevailing upon the companies to replace worn screens.

But when the commission refers to this as "a system which knows no remedy but a strike," one feels obliged to immediately take issue with such a statement. Certainly some practical method might be evolved for solving this difficulty as, for instance, the operators could be required to make the original spacing of their bars $1\frac{1}{8}$ in., and to replace them when the opening exceeds $1\frac{3}{8}$ inches.

DIFFERENT COALS PRODUCE VARYING PERCENTAGES OF SLACK

The Fifth Objection of the miners is, that owing to the varying hardness or softness of the coal in different mines, and even in different parts of the same mine, a corresponding higher or lower percentage of lump coal is obtained. Naturally a great variation of this kind would affect the earnings of a miner appreciably, although the commission is of the opinion that it is not a weighty consideration. In any event it is a difficult matter to ascertain, and could only be arrived at by careful experimentation with each mine and even different parts of the same mine. Generally speaking, it might be said that differentials in the working places at all mines is an ineradicable evil. Even under the present mine-run system all know that each mine has its "good" and its "bad" places, it being the customary practice to bestow the more favorable upon the best workers or the oldest employees.

Sixth Objection.—Coming finally to the concluding argument of the miners we find this to be founded on the contention that since the operators benefit by obtaining a large proportion of slack there is no premium placed upon skilled labor. As the report rightly points out, the validity of this claim hinges on the commercial value of the finer grades. In the opinion of the commission the large proportion of unskilled labor in the mines today is due to the introduction of mechanical devices, which has eliminated the necessity for trained labor. It might further have been mentioned, in this connection, that there is usually a great scarcity of labor and that it is becoming increasingly difficult to attract any but the lower class of workmen to the mines.

THE OPERATOR'S OBJECTION TO THE MINE-RUN SYSTEM

The crux of the argument is finally arrived at in "the operators' objections to the mine-run system," and a more or less successful effort is made to prove the uneconomic principles upon which the miners' demands have been conceived.

First Argument.—As an opening gun on the subject the operators endeavor to undermine the fundamental principles upon which the miners' demands are based, by seeking to have the claim for legislative interference set aside. Accordingly they point out the fact that the miners' organization is one of the most powerful in the country and well able to adequately protect its own interests. Labor has indeed learned its lesson from syndicated capital with its interlocking directorates, alliances, etc., and has, in fact, become syndicated labor, with a latent brute power of passivity no longer to be denied.

The producers also show that legislative action in this connection materially weakens their position in future wage contentions with the miners. This position of the operators is well taken. As all know, the periodical fixing of wage scales invariably winds up in a compromise, each side giving and taking until an agreement is finally reached. This ruthless seizure of what might properly be considered one of the most valuable assets of the operators is clearly unjust. Or, as the operators point out, if this condition must be met it is only logical that a fair and equitable wage scale should be fixed upon under the same arrangements. They have also shown a commendable fairmindedness in this connection by repeatedly offering the miners the same wage scale as now in effect in

Illinois and the fact that the latter have consistently evaded a definite reply to this condition, must inevitably lay them open to suspicion.

Although the commission concedes that to take away from the Ohio operators the right to grant the mine-run basis of payment will seriously handicap them at the pending wage conference, it nevertheless feels that it "cannot push this objection very far." This it does on the premises that its instructions were to find an equitable basis of payment if the present mode should be considered unfair. Apparently the commission assumes its instructions to take precedent over all considerations of an economic character—an obviously unsound principle.

AN INCREASED PERCENTAGE OF FINE COAL

Second Argument.—This objection of the operators is based upon the contention that the adoption of a mine-run system of payment must inevitably bring about a large increase in the production of slack coal. The controversy focuses on this phase of the problem and the powerful arguments which the operators advanced, are ample evidence of the almost panicky fear in which they hold the adoption of any such measure.

It is, of course, clear, as the operators point out, that heavy shooting of the coal would, no doubt, be a result of the mine-run system of payment, since the miner would have nothing to lose by an excessive breaking up of the coal, whereas his labor would be materially lessened. If, as the operators claim, a great deal of trouble is already experienced in finding a profitable market for finer grades, an increase in the proportion of these must naturally be viewed with apprehension.

The commission clinches this argument by citing the testimony of a coal inspector, with broad experience, whose company uses three-quarters of a million tons of Ohio coal annually. This witness states that at the second screening of the Ohio coal, at the head of the Lakes, from 35 to 40 per cent. of slack is taken out. In answer to a direct question as to what effect a further increase of slack would have, he stated that "it would certainly work to the disadvantage of Ohio coal and would have a tendency to cause us to seek coal elsewhere," and, further, in reply to a question along similar lines: "From my standpoint as an inspector, I would certainly advise our people to dispense with the use of that coal."

This issue is more or less generally conceded by all parties to the controversy, and as the commission directly points out, the situation hinges upon just what the increase in the percentage of slack would be under a mine-run system of working. While confessing its inability to reach a decision on this matter, the commission states that all are agreed that where shooting off the solid is practised, the increase in the percentage of slack would be large. But since only between 5 and 10 per cent. of Ohio coal is mined in this manner, this does not become an important consideration. The operators rightly contend that the miner is compelled to use precaution in shooting his coal under the present system and even goes to extra labor in breaking up large lumps, while under a mine-run basis of payment he would be relieved from any restraint whatever in this connection, with the result that indiscriminate blasting of the coal would be practised which must inevitably result in a large increase in the production of slack.

HARRY N. TAYLOR ON THE SLACK QUESTION

The arguments of the operators certainly lack nothing in plausibility, but the commission finds that the miners advance equally sound arguments in rebuttal. They claim that such heavy shooting as described by the operators would blow down the props and scatter the coal so that it could not be recovered. It is clearly a delicate question to decide and one that may vary greatly in different mines, kinds of coal and even with the personal equation of the miner himself. Because of the contradictory nature of the testimony, the commission freely conceded that it has been unable to arrive at a definite conclusion on this subject and that it has been obliged to rely upon testimony of witnesses residing outside of the state.

For this reason, then, it has rested its case almost entirely upon the opinion expressed before it by Harry M. (N. ?) Taylor. Mr. Taylor states that "in the solid-shooting mines there is an enormous increase in the percentage of screenings and the quality of the coal has been deteriorated by the mine-run system, but where the coal is underdressed by machines this condition does not exist." In view of the great importance attached to this testimony, one is rather inclined to investigate the record of the witness in order to determine his credibility. In reviewing the history of Mr. Taylor*, it is noted that he has had an almost spectacularly successful career. He has advanced rapidly and apparently upon his own initiative from one position of responsibility to another and has been repeatedly honored by appointment to the highest office which it was in the power of his coworkers to bestow upon him. He is a man of unblemished character, vigorous personality, quick and accurate decision and occupies a pre-eminent position in the coal industry.

CREDIBILITY OF TAYLOR AS A WITNESS

But some question may arise as to the competency of Mr. Taylor's testimony on conditions in Ohio, when it is noted that his experience in that field was confined to a period of six years, between the ages of 16 and 22 years, and that he left there 27 years ago. It would seem that testimony based upon the impressions formed by a mere stripling over a quarter of a century ago should be carefully balanced before being so freely accepted as the commission apparently does.

But Mr. Taylor's testimony, in the opinion of the commission, adequately refutes the contention of the operators, regarding their fear of an excessive increase in the proportion of slack coal, and the commission believes that the chief danger will be due to the probable increase in the percentage of impurities. The commission states that in their opinion the operators should be protected to the extent that they should not be required to pay as much for the smaller grades as the larger sizes.

But when it says, "the contracts between operators and miners to have the men paid on a mine-run basis might be made conditional upon keeping the amount of fine coal within the limits established by this fixed percentage," one rather gathers the impression that the commission retains the privilege of readjusting its conclusions to suit its convenience. On pages 37 and 38 of the report, the commission points out the large discrepancies in the amount of screenings made, finding on occasions variations ranging from 5 to 45 per cent. In the minds of

the commission, this was considered "the strongest argument against the present system." If such difficulties arise where exact methods have been specified for accurately determining the amount of slack made, what might the discrepancy be when less effective measures are used?

Before finally closing the discussion on this subject, the commission comments on the broader general usage into which these finer grades are coming, and their consequent enhanced value. The report states that the demand for these grades is increasing to such an extent that it is occasionally necessary to even crush the larger sizes. While it is true that appliances have been devised for burning fine coal, and there has been considerable development in this direction in the past decade, it is equally true that special and rather elaborate equipment is necessary, and that where the consumers go to this extra expense they must naturally expect to profit in their fuel bills. Indeed it would appear that the general assumption that an important market for the finer grades has already developed, would show a tendency to anticipate industrial advancement that is yet to be realized in actual practice.

INCREASED IMPURITIES UNDER THE MINE-RUN SYSTEM

Third Objection—The third objection of the operators is that the mine-run system would result in a great increase in the amount of impurities which, in the words of the commission, "is the strongest objection to the adoption of the mine-run system." The report enters into a detailed discussion on the technique of cleaning coal underground and the difficulties attendant upon obtaining satisfactory results. The necessity for a thorough cleaning of the coal is also dwelt upon at some length. Strenuous competition with coal from other states compels the local producers to insist upon as thorough cleaning as practicable, and even where considerable expense is gone to in this direction, it is shown that consumers still continue to complain.

The report then takes up a number of methods of treating coal to remove the impurities, laying considerable emphasis upon the washing process. The fact is brought out that mines operated on the mine-run system in Illinois are generally equipped with washers as well as other devices for thoroughly sizing the coal. It is also shown that the few washers which have been installed in Ohio have not "proved very successful from a commercial standpoint," in spite of which fact, however, "the commission feels compelled to say that Ohio operators might well go farther to get clean coal." This rather ambiguous conclusion is difficult to reconcile.

On the other side of the question, however, the miners claim that they would clean their coal as well under a mine-run basis of payment as under a screen-coal arrangement. It is stated that these arguments "did not greatly impress the former commission" before whom they were also placed and "neither do they greatly impress the members of this commission." It is generally agreed by all that most of the miners make an honest endeavor and go to a reasonable amount of trouble on their own initiative to load clean coal; but since only a small percentage loading poor coal may have a serious, if not disastrous, effect upon the average product of the mine, the promulgation of any recommendation affording opportunities for increasing the impurities should be given serious consideration.

*See "Coal Age," Vol. 2, page 292.

The commission agrees that if the mine-run system opened fresh opportunities for the miner to load impurities that some at least would do so, and "would not other men employed in the mine be tempted to do the same thing?" It is conceded that such a temptation would exist, and "that even 10 per cent. of dirty loaders at a mine would make it difficult for operators to get their coal in marketable shape." But the operators must be rather startled at this point to note that the commission states: "miners say that they do not demand pay for dirt." In view of the fact that it is customary to "dock" or fine miners found guilty of loading impurities, it is gratifying to note that the men are at least prepared to temper their demands to the extent of not demanding pay for loading such impurities. Indeed the commission quite appropriately asks: "How is it possible to clean the coal before it is weighed?" Obviously this is impossible.

TESTIMONY ON IMPURITIES QUESTION

Testimony was taken from both operators and miners as to what effects the adoption of the mine-run system would have upon the percentage of impurities in the coal, and as was to be expected the evidence was of an exceedingly contradictory nature. The miners testified to a man that equally clean coal would be produced under the mine-run basis of payment, as is now obtained with the screen coal. The operators are equally positive that there would be a large difference and cite the effects of the mine-run system according to the report of the state geologist of Arkansas, while the commission itself agrees that the testimony of operators in other states tended to substantiate this belief.

In attempting a solution of this intricate problem the commission again relies almost exclusively upon the opinions of Harry N. Taylor, and in doing so it calls attention to the fact that since the testimony of this gentleman was adverse to the operating interests in the first instance that it is only fair that the miners should accept his conclusions in the present case. As already pointed out, there were grave reasons for taking exception to Mr. Taylor's previous testimony, although the general competency of the witness was agreed to. This exception does not apply in the present instance for the reason that Mr. Taylor has been in intimate touch with the conditions of which he speaks throughout his career.

In response to a query as to what difference exists where a miner is loading coal on a screen-coal basis as compared with a mine-run basis, Mr. Taylor said: "If a man was cleaning up his place, he cleaned it up just as clean as this floor, because he gets paid for it, if it is being weighed and paid for as mine-run." As to cleaning coal, when loading mine-run, Mr. Taylor said: "They don't clean the coal any better; in fact, they shovel in the refuse of the room; that is, they load everything out that weighs anything."

WASHERS A NECESSARY ADJUNCT OF THE MINE-RUN SYSTEM

Mr. Taylor states further that where the mine-run system has been adopted in northern Illinois, the proportion of impurities in the screenings amounts to between 20 and 30 per cent.—obviously an unmarketable product. This has made it necessary to construct washers in order to remove these impurities and it was shown that this added from 10 to 20c. per ton to the cost of the washed coal.

Mr. Taylor also gives some particularly valuable testimony regarding the impurities in coal, and the various subterfuges which the miners resort to in loading these out. He segregates the impurities into two general classes, the bone coal, which customarily occurs in a relatively thin stratum, "frozen" in an otherwise perfectly clean seam, and the clay minings found in the bug dust.

Speaking of the bone coal, Mr. Taylor said that he has known of repeated instances where miners would take the grease from a car wheel and cover up all evidence of this impurity in a large lump, rather than take the trouble of breaking same up and removing the impurities. As to the bug dust in the coal, Mr. Taylor calls attention to the fact that the addition of this not only forces the operator to pay for something he cannot sell, but that it materially effects the value of his product. In fact where this occurs the finer sizes cannot be sold except by giving them a thorough cleaning in the washer, a condition that was conclusively proved in Illinois, when the mine-run basis of payment became operative there. Mr. Taylor says, finally, that, "the entire method of handling coal in Illinois has been changed."

The question was put up to Mr. Taylor as to whether the miner would load out the fine clay made in working the machine in a clay seam, to which he replied: "The men will load everything that is loose in that room, where under the lump-coal system they formerly left that in because it didn't do them any good," and he went on to state further that it was impossible to apprehend those guilty of doing this.

The commission concludes this phase of the discussion with the statement "that the adoption of the mine-run system would cause a considerable increase in impurities unless some way was found to protect the operators." In view of the subsequent recommendations of the commission that the mine-run system be adopted, it would seem only reasonable that the commission should be called upon to first offer a solution of these obstacles, which even it concedes.

Fourth Objection—The concluding argument of the operators is that they would be forced to "considerable expense in rebuilding and rearranging their tipplers." This objection, as is pointed out, is more or less incidental, and there is no doubt but that the operators as a whole would be willing to meet this expenditure under favorable conditions. It would seem, however, that the commission is inclined to under-rate this item, and it will doubtless be found that the statement, "All that would be necessary to do would be to cover the screens and to continue to dump the coal," will not apply to a great many mines. Should the operators be compelled to install washing plants in order to clean their finer sizes, this heavy expenditure will assuredly close up all the small operations in the state and possibly many of the larger.

"CONCLUSIONS AND RECOMMENDATIONS"

First—The commission finds that the "present mode of payment is not an equitable one," justifying its position in this matter mainly on the grounds of the inaccuracies in screening the coal. As already pointed out, a simple remedy for this evil might easily be devised. In fact, indications point to the conclusion that the commission has recommended according to "instructions" rather than on the true merits of the controversy.

The report also comments upon the inborn prejudice of the miners against the present system of payment, which even the commission itself confesses its inability to substantiate with tangible facts. The commission asserts: "There would be carload after carload of fine coal sold, which has been produced by their labor, and for which they imagine they have received no pay whatever." One feels inclined to ask if the commission has given equal consideration to the feelings of the operator who will probably see "carload after carload of fine coal" going onto the rock dump after the new measure has been enacted?

Second—The second conclusion of the commission refers to the question of the increased amount of screenings and the greater amount of impurities in same. As already noted, the commission agrees that a very material increase in the amount of impurities in the finer grades will result, but it fails utterly to suggest a remedy for this evil.

As to the question of an increase in the percentage of screenings, the commission does not believe this will be of sufficient proportion to be of economic importance except in solid-shooting mines, and since it embodies a recommendation that all solid shooting be prohibited for the reason that this is a prolific cause of accidents, this objection of the operators seems to be adequately disposed of from their point of view. But it should be remembered that this question is still open as the commission failed to prove it as conclusively as some will expect.

Under the proposed mine-run basis the report points out that there would be an incentive for the miner to load out all the fine coal, and that this condition would, therefore, prove advantageous from a conservation standpoint. The correctness of this theory is in much question. The report has quite conclusively proved that the finer grades will carry such a high percentage of impurities under the mine-run system, that it will be impossible to market them unless they are first washed. It may be safely assumed that none of the smaller operators are financially able to undertake the installation of washer plants while it is also reasonable to believe that many of the larger operators will not feel inclined to materially increase their mining investments in Ohio. This brings one to the inevitable conclusion that instead of conserving the coal, as this measure is intended to, it is highly probable that a greater percentage will be lost and the interests of conservation even more effectively defeated than is now the case.

The commission concludes its report by conceding that it is unable to state whether the adoption of the mine-run system will result in the miners shooting their coal harder and states that "it would be the part of wisdom to provide safeguards for the mine owners."

IN CONCLUSION

It would be well for the Ohio operators to prepare for a defeat in this measure. The trend of public opinion is too unmistakably adverse to capitalistic interests to anticipate a decision favorable to them. The best that can be expected is the customary compromise which, however small, spells victory to the miners since they have nothing to lose and everything to gain.

Whether one be for or against the political innovations of the present day, all must agree as to their radical na-

ture. Driven on by an insistent popular clamor, the movement is evident on every hand from the insignificant city council to the national assembly at Washington. Time alone will prove the wisdom of these new departures, but it is a significant fact that serious physical conditions are already arising that throw grave doubts over the future. The attacks on corporate interests are by no means at an end and we are even now facing the problem of restoring the confidence so essential to the aggressive expansion which has characterized American enterprise in the past.

Class legislation is becoming so common that it is no longer thought necessary to attempt concealment. A notable example of this is the "rider" attached to the Sundry Civil bill enacted last year, providing that no part of the \$300,000 fund set aside for prosecutions under the Sherman act should be used in cases against labor unions or farmers. A direct law exempting labor and the farmers from action under the Sherman act would have been promptly declared unconstitutional.

A TRANSITIONAL PERIOD

Our best students of economics are agreed that a transitional period is at hand. The representative form of government was an institution developed by oppressive political conditions that have long ceased to exist and it has not been found effective in dealing with the intricate problems relating to competition, insurance and credit. In fact it is the consensus of opinion among the best thinkers of the day that our entire social system is strikingly unfair.

The trouble is largely a psychological one, a protest against fundamental conditions, rather than the mere question of hours and wages. The proletariat is becoming more sensitive and critical with the wider diffusion of education while the modern changes in the character of labor are tending toward a loss of individuality and hence creating a lack of interest and a subsequent dissatisfaction. The evils of the fiduciary system, wherein the owner is replaced by a manager or agent, is also a prolific cause for disturbance.

As to remedies for these new conditions one finds a great diversity of opinion. Some think there must be a radical readjustment in the conditions of labor, with provisions for old-age pensions, etc. The socialists, of course, demand their "disciplined democracy" and make a strong plea for a closer understanding and more intimate relationship between the laborer and his employer.

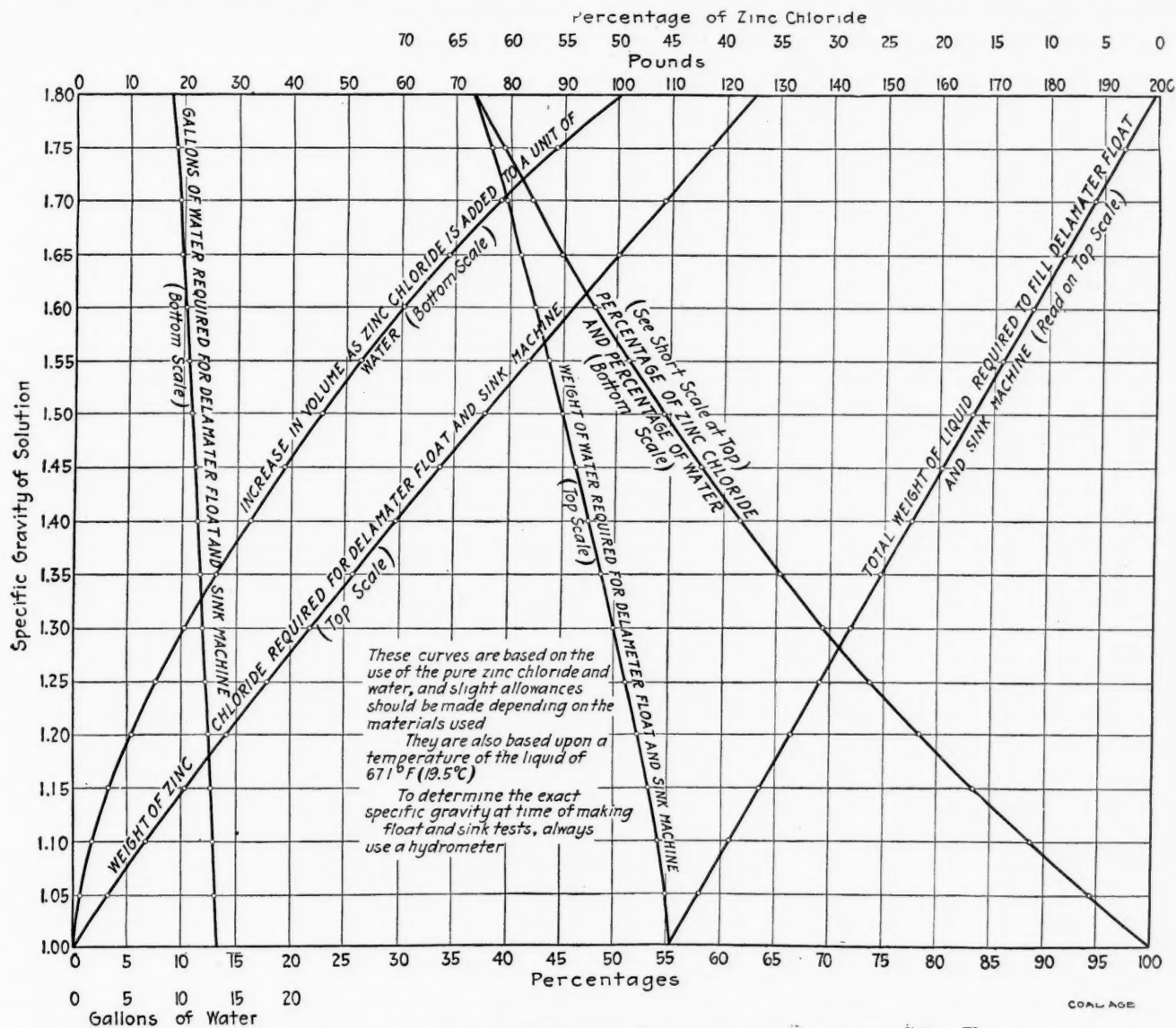
But whatever the corrective, the conservative thinker will agree that it must be one of gradual evolution. Society is too complex, too strongly established to make feasible an abrupt and arbitrary revolution without precipitating an untenable economic situation. Radical innovations tending to effect abrupt changes in established lines of industrial endeavor are to be viewed with suspicion. The world's commerce is gaged upon delicately balanced fundamental conditions, the ruthless disruption of which must inevitably be accompanied by dire results.

Postscript—Since the publication of the first article on this subject, later advices from Ohio have been received which indicate an even more tense situation there than was thought. While we are not at liberty to use the additional information at the moment, it is probable that COAL AGE will have some interesting disclosures to make in this connection in the near future.

A Float-and-Sink Test Diagram

In the washing of coal, it is often desirable or absolutely necessary to determine whether or not the washer is doing the work expected, or whether the separation of the coal from the slate and other impurities is as complete as required. Attention was drawn to this matter in an article by G. R. Delamater entitled *Washery Plant Control*, *COAL AGE*, July 20, 1912, p. 82. In that article,

The vertical scale at the left shows the specific gravity of the solution, while the curved lines of the diagram show, respectively, the gallons of water required in the use of the Delamater machine; the weight of zinc chloride, weight of water and total weight of liquid solution, corresponding to any given specific gravity from 1 to 1.8, which is a sufficient range for any ordinary coal test. The diagram also shows the corresponding percent-



A VALUABLE DIAGRAM FOR USE IN MAKING SOLUTION FOR FLOAT-AND-SINK TEST

Mr. Delamater described what is known as the "float-and-sink test."

The test consists in preparing a solution of zinc chloride of such density that the purer quality of the washed coal will float therein, while other portions of the coal that contain too much impurity will sink to the bottom of the tank. In making this test, the float is skimmed from the surface of the liquid, dried and examined. In the same manner, the sediment at the bottom of the tank is removed, later, dried and examined. Without going further into the details of the test, which was fully described in the article mentioned, the accompanying diagram is sufficiently self-explanatory to be of interest.

age of zinc chloride and percentage of water, together with the percentage of increase in volume caused by the addition of the salt to the water.

While the diagram is an ingenious combination of curves giving the data that are of particular interest in testing the results obtained in the washing of coal, it is recommended that use should always be made of a suitable hydrometer to check the specific gravity of the solution when making a test; as the temperature and any differences in the materials employed will vary the density of the solution to a slight degree. The diagram is particularly useful in making up solutions for a given test.

The Gases in Coal

N. H. Darton, geologist in the U. S. Geological Survey, addressed the New York Section of the American Institute of Mining Engineers on Friday, Jan. 16, in the Engineering Societies' Building, 29 West Thirty-ninth St., New York. The address entitled, "Mine Gases" covered some researches and inquiries into the problem of gas emanation conducted under the auspices of the U. S. Bureau of Mines, with which Mr. Darton was for some time connected. Mr. Darton, while perhaps not a forcible speaker, has a remarkable facility of expression and a clear comprehension of his subject.

STRATIGRAPHY AND GAS EMISSION

The Bureau of Mines experts made their experiments in southern Illinois and in the northern anthracite field, the object being largely to connect if possible the stratigraphic conditions—cover, flexure, depth and faulting—with the volume of gas emanation.

It seems to have been in a degree a blind lead for on the whole the methane content and the emission of the gas, according to Mr. Darton, depend rather more on the actual coal substance than upon the conditions of occurrence mentioned. Yet as will be seen there are exceptions which will be later stated. The origin of the coal, its proximate composition and porosity, none of which were investigated, Mr. Darton declares, are the determinants of its gas-giving qualities. These facts are, of course, shrouded in much mystery and there seems no way of assuring oneself as to the volume and character of gas given off by any seam or part of a seam except by actual test. However, Mr. Darton's facts as collected are of great value and no little interest.

VOLUME OF GAS IN COAL SAMPLES

The volume of gas given out by coal subject to laboratory examinations varies over a wide range. English bituminous coal gives a volume of gas 75 to 82 per cent. of its own volume; cannel coal from the same country 40 to 70 per cent.; semibituminous 99 per cent., steam coal 500 to 811 per cent. and the Ryhope coal 1000 per cent. The coal at Nanticoke, Penn., gives a volume of gas 3.1 times its own volume (310 per cent.) that at Benton, Ill., after 75 weeks 1.82 times, that at Harrisburg, Ill., after 40 weeks 1.05 times, that at Pocahontas, Va., 0.047 times in 45 weeks and that at Connellsville 0.16 times in 60 weeks. It will be seen that anthracite contains the most gas.

THE IMPERMEABILITY OF COAL

An attempt was made at the Bellevue mine in Belgium to show to what extent the gas was bled by workings advancing toward coal and it was shown that coal is extremely resistant to the transpiration of gas through its pores. At Beaulieu mine in Belgium it was proved that violent outbursts breaking down large quantities of coal lowered pressures in the coal bed and might at a near-by point prevent them from reaching their former values and even deter them from exhibiting any subsequent recovery. But at a point only slightly remote, the drop following an outburst was only temporary and the pressure continued to rise after the decline in pressure was compensated. The difficulty in bleeding gas from coal was most forcibly illustrated by these experiments.

GAS PRESSURES IN ENGLISH COAL RISE TO 425 LB.

L. Wood gives the following pressures of gas obtained in English coal mines. A hole was drilled in the coal, a pipe was inserted and the space between the pipe and the sides of the hole tightly tamped, the pressure developed being measured by a gage.

GAS PRESSURES IN ENGLISH COAL MINES

Mine	Depth of Hole, in Ft.	Pressure in Lb. per Sq. In.	Time Takes to Reach Maximum in Hr.
Bolden	19	425	190
	23½	381	25
	28	176	60
	32	461	60
Epplerton	3½	54	1
	7½	104½	34
	24½	204	106
	25	221	51
Harton	37	223	174
	47	235	294
	16	197	135
	27½	231	126
	37½	296	84

Some attempt has been made to represent by a formula the relation of pressure to depth from coal face but the exceptions are almost as important as the agreements with the formula propounded.

GAS AND DEPTH OF COVER HAVE LITTLE RELATION

Apparently Mr. Darton's experiments showed that gas does not collect on anticlines unless they contain a large amount of crushed material. Sandstone in an arch will break and leave crevices, and gas may be found under such conditions but when the roof is shale which will flow readily, the breaches of folding are soon healed and the roof becomes so unbroken and impervious that gas cannot collect. So drillers may look for natural gas in anticlines but mine gas is not usually to be found in any greater quantity there than in synclines.

It was thought that deep coal would perhaps be excessively gassy because the opportunity for the release of gas is not provided where beds are protected by heavy cover, but while the gas content increases with depth up to 200 ft., greater depths do not seem to make any change in gaseous emanations. It was thought that the coals south of Nanticoke which are 2500 ft. below sea level might be rendered unworkable from this cause but the facts established hardly favor this idea.

Yet the nature of the cover is believed to have some effect. A chalk cap in Europe is supposed to have caused an increase in methane content and an igneous rock formation in Natal is also credited with making coal gassy.

RELATION OF GAS EMITTED TO AREA EXPOSED

Most of the measurements made were to discover the relation of the volume of gas emitted to the coal area exposed in districts of mines making gas. And this was found to vary not only from seam to seam but freakishly in the same seam. Of course, this variation is somewhat generally known and it seems to have some connection with the paleobotany of the formation and the porosity of the coal. In the Lance Colliery, Penn., the emitted gas was as follows:

GAS IN LANCE COLLIERIES

Bed	Cu. Ft. per 1000 Sq. Ft. of Coal Exposed
Red ash	0.73
Ross	1.00
Five foot	1.67
—East Side	0.23
—West Side	2.30
Hillman	1.00
—East Side	
—West Side	

The gas in the South Wilkes-Barre colliery ran 0.22 to 5 cu.ft. per 1000 sq.ft. The Dorrance mine near Wilkes-Barre is probably the most gaseous shaft in the world. It produces 3390 cu.ft. of gas per min. The Red Ash at that colliery emits 1 cu.ft. per 1000 sq.ft., the Five-foot 2.5 cu.ft. and the Hillman 1.8 cu.ft.

EFFECT OF IDLENESS ON GAS EMISSION

A strike occurred during the course of the investigations and an opportunity was afforded to gage the effect of the idleness of the workings on the emission of gas. The results were contradictory but they did establish the fact that working or idle the mines appear to be about equally gaseous and sometimes emit even more gas after the stoppage than before. Thus for the Lance mine the following figures were obtained:

GAS FROM LANCE MINE OPERATING AND IDLE		
Current	Volume Under Working Conditions	After a 2-week Strike
Total upcast.....	2690	3120
Hillman.....	555	706
Cooper.....	508	678

But some other anthracite mines show a decrease and in Illinois there was usually a decline in emission as a result of the suspension but not always.

The pressures in the Illinois mines were quite variant. The mines showing the highest pressures of those measured were Ziegler mine 25 to 33 lb. per sq.in. and Dering

No. 18 24½ to 24¾ lb. The United mine, strange to say, showed no pressure whatever.

The gas may be estimated in cubic feet per ton mined and the table below shows this relation.

GAS LIBERATED IN TERMS OF TONS MINED

Locality	Cu.Ft. per-Ton Mined	Relative Volume of Gas to Coal
Germany.....	16 to 1060	½ to 30
Austria.....	7469	300
Wilkes-Barre.....	1500	60
Anzin, France.....	1377	55

[These figures are much larger than those of laboratory tests, which, perhaps, is natural.—Ed.]

Mr. Darton said that though a low barometer caused an increase in gas escaping into the airways it did not cause sufficient to endanger a well ventilated mine.

GAS AND SEISMS

The discussion largely turned on the effect of earthquakes in causing explosions, and of volcanic release in making them less likely. When an earthquake takes place, the gas in the measures is possibly liberated by the shaking. If care is not taken this gas is ignited and explosions result. No one asserted that the alleged coincidences in the occurrence of earthquakes and explosions proved that a connection existed between them and as someone pointed out many explosions probably resulted from dry coal dust only and such disasters could not be charged to seismic action.



THE SWITCH TOWER THAT CAN DIVERT THE TRAIN NINE TIMES OUT OF TEN

Who's Who--In Coal Mining

After Director Joseph A. Holmes, the one man who has been most closely identified with the inception and development of the United States Bureau of Mines, is Herbert M. Wilson, the engineer in charge of the experiment station of that bureau in Pittsburgh, Pennsylvania.

Though educated in mining, as well as civil engineering, Mr. Wilson, whose practice has been largely along other engineering lines, owes his active association with the mining industry to his capacity in managing engineering work.

When in early 1907 Secretary James A. Garfield added a technologic branch to the United States Geological Survey, Director Charles D. Walcott, of the latter institution, selected Doctor Holmes as the chief of the new division, and as his principal assistant, H. M. Wilson was appointed because of his proven capacity in the organization and management of some of the most important of the engineering works of the Geological Survey. Mr. Wilson entered upon his duties as chief engineer when the technologic branch consisted only of divisions of fuel-testing and structural materials testing and investigations.

In the next two years the foundation was laid and the work fully organized for the testing of the fuels of the United States, much as it is now conducted in the Bureau of Mines, and testing and investigations of the structural materials for the United States as now carried on in the Bureau of Standards were also developed to practically their present status.

At this time also began the investigation of mine accidents. The result of this work was such as to attract the attention of the nation and of Congress to the need of a Bureau of Mines to carry on such work, and this was authorized by Congress in 1910. The headquarters for the field and technical work of that bureau were established in Pittsburgh, where Mr. Wilson has since been stationed as an engineer in administrative charge.

During the formative work of the Bureau of Mines, the subject of this sketch had opportunity to familiarize himself in detail with the various lines of work conducted by that bureau, serving successively as active technical head of the fuel and mechanical investigations, and of the chemical and physical investigations pending their organization into divisions under separate chiefs.

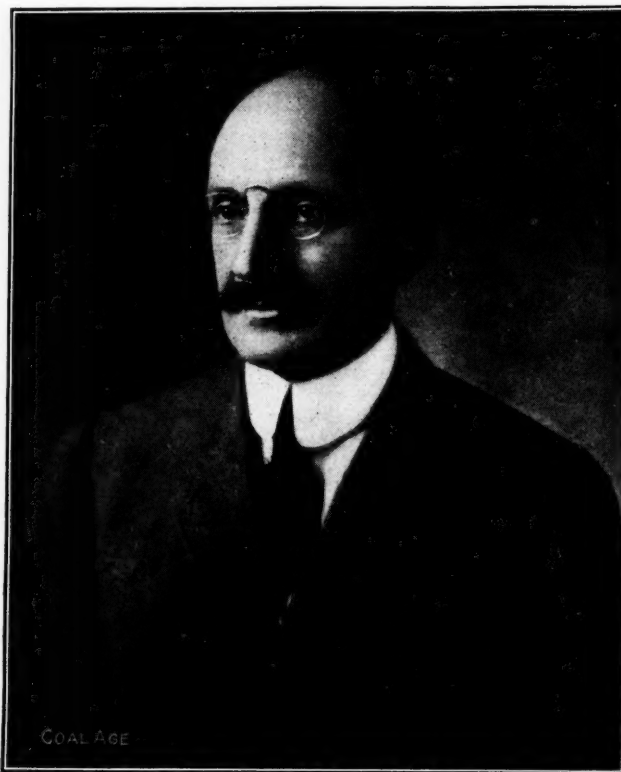
In the beginning of the mine-accident investigations Mr. Wilson was closely associated with the design and installation of the equipment for testing of explosives, and the building of the various rescue cars and stations, and with other branches of that portion of the mining work of the bureau associated with safety work. In addition to all this, he still continues the active direction of the field force concerned in safety demonstrations and training, and the management of the rescue cars and stations, and their personnel.

The humanitarian side and the educational methods of that portion of the work of the bureau necessary to the extension of safety, education and training could not have fallen into more sympathetic hands. Herbert Wilson's

active interest in the welfare of the workman and his well-being was promptly recognized and he was soon drafted as one of the organizers and as a member of the executive committee of the National Council for Industrial Safety. He has been actively identified with the work of the National Fire Protection Association in its efforts to bring about safety from fires in cities and in mines, being chairman of the Committee on Mine Fires.

HELPED TO CREATE THE AMERICAN MINE-SAFETY ASSOCIATION

He was actively identified with the organization of and was first president, and is now secretary, of the American Mine-Safety Association. This was the first step toward



HERBERT M. WILSON

bringing together the operators and mining engineers for the standardization of safety apparatus and first-aid-to-the-injured methods. With a zeal born of the inspiration of a great humanitarian task to be performed, Mr. Wilson carried the association through its first struggling year and passed the period of doubt until today it is one of the potent factors in the reduction of deaths in the mines.

Not until the first gathering of the operators and engineers from different localities throughout the country had any of the members of this new association realized the great importance of the movement. It is difficult to measure in terms of lives saved the work accomplished

by this association through the efforts of its pioneer, Mr. Wilson. We can only take the evidence adduced from the members who declare that as a result of their getting together and their discussions, many of the mines throughout the country have taken a new and much more intelligent interest in both rescue and first-aid work, and that the movement is extending in a more rational way throughout the country.

It does not require much imagination to realize that in the coming years many miners may be spared to their families through the good accomplished by this association, which started with the idea of Herbert Wilson. If as someone has said, the mine rescuers are "soldiers of humanity," Herbert M. Wilson is one of the great leaders in this humanitarian army. Mr. Wilson is a member of the American Society of Civil Engineers and of several other technical societies.

In connection with these activities and especially with the Bureau of Mines, he is already well known by those in the mining industry who are concerned in safety and rescue work in mines.

Herbert M. Wilson was born of English parents in

Glasgow, Scotland, Aug. 23, 1860, and came to the United States when but a few months old. He was educated in the public schools in Plainfield, N. J., where he lived until he left college. He took a year's preparatory course in Cooper Union, New York, before entering the School of Mines, Columbia University, from which he graduated in 1881.

His initial professional work was on the designing and construction of the first United States Electric Lighting plant, built in New York City; subsequently he spent a few years on railway construction in Mexico. The next 15 years were spent in topographic surveying and in irrigation engineering in nearly every state in the Union. The larger portion of this period was passed in the far West.

This early experience in the organization and management of engineering work and surveying, thrown on his own resources in remote portions of this country and Mexico, were splendid training for his subsequent work in the management and organization of similar enterprises in the technologic branch of the Geological Survey, and in the Bureau of Mines.

A Safety Banquet in West Virginia

SYNOPSIS—The United States Coal & Coke Co. gives its fourth annual Safety-Boosting Banquet to its employees. This banquet is one of the many devices this firm employs to foster the safety morale of its working force.

It has now been several years since the various companies constituent and subsidiary to the United States Steel Corporation began an aggressive campaign for the reduction of accidents to employees. The motto, "Safety First," then launched, has since spread to the four corners of the continent and become the slogan of innumerable commercial, industrial and transportation enterprises.

The fourth annual Safety-Boosting Banquet of the United States Coal & Coke Co., a subsidiary of the steel corporation, was held at Gary, McDowell County, W. Va., Saturday evening, Jan. 10, 1914, with about 175 persons present, of whom approximately 150 were foremen and subforemen of the company, while the balance was composed of state officers, professional men and ex-officials of the company.

A simple but extremely palatable menu was first served, after which the real business of the evening began. Papers were read upon the subjects of Efficiency and the Elimination of Accidents in (a) The Cutting of Coal by Mining Machinery, by J. M. Tulley; (b) The Loading of Coal by the Miner, by W. W. Harding; (c) The Setting of Mine Timbers, by W. P. Kearns; (d) The Transportation of Coal by Motors, by A. N. Harris; (e) The Handling of Supplies, by C. G. Seaton. Papers were also read upon the following subjects: The Prevention of Gas or Dust Explosions, by J. R. Booth; The Feeding of Live Stock, by H. T. Graham; The Care of Live Stock, by G. A. Wilson; Efficient Ventilation of Mines with a View to Eliminating Accidents, by A. G. Hahn; The Inspection of Mines with a View to Eliminating Accidents, by J. L.

Mullen; Efficiency in Mining Engineering with a View to Eliminating Accidents, by H. W. Saunders; Efficiency in Mechanical Engineering with a View to Eliminating Accidents, by R. H. Davis; Efficiency in Electrical Engineering with a View to Eliminating Accidents, by Eli Clemens; Statistics on Results Accomplished in Accident Prevention, by H. N. Eavenson.

The hall in which the banquet was held was simply yet tastefully decorated with boughs of evergreen and rhododendron, also the national colors, while safety mottoes were conspicuous. In the front of the hall, facing the audience, was the representation of a mine heading, illustrating the system of timbering adopted by the company. As a special feature of the banquet the foremen's Honor Table was provided, at which were seated 17 foremen and assistants who had a record clear of fatal or even serious accidents for at least six months. Some had a clear record for as long as 26 months.

In order to give these officials an incentive to be constantly on the alert for dangers which may cause accidents, the company gives a premium to each of its foremen and assistants, each month, for a clear accident record. Of this premium system, as well as other means employed by this company to eliminate accidents, COAL AGE will have more to say in an early issue.

Among the guests present were Messrs. Earle A. Henry, Chief of the State Department of Mines, Lawson Blenkinsopp, district mine inspector, also attorneys at law, coal operators, representatives of the public and technical press, etc.

Unfortunately, Gov. H. D. Hatfield was unable to attend the festivities, being detained by other important business. He, however, telegraphed his regrets, and forwarded a letter reading in part as follows:

To the officials of the United States Coal & Coke Co., in banquet assembled:

I feel that I would be deeply lacking in the sense of appreciation of services well done did I not take advantage of this opportunity to extend to you my heartiest felicitations upon the unprecedented strides made by the United States Coal & Coke Co.'s officials for the protection of human life.

I trust that your activities in the precautions taken against the hazards of the mining industry will continue to the extent of maintaining you in the position you now occupy in the fore rank of those great companies which hold as their guiding motto "Safety First," and which have demonstrated the practicability of that ideal.

The day has passed when it can longer be contended that precaution in the mining industry is impractical—that it is too expensive to look after the welfare of humanity—and to General O'Toole and the other officials of the United States Coal & Coke Co., recognized pioneers in the movement for the prevention of accidents in coal mines, the people of our state owe an everlasting debt.

A perusal of reports shows me that you have an average tonnage of 476,454 for each fatality in the mines at Gary, your record standing out in sharp contrast to the general average in McDowell County, which shows the fatality tonnage to be 141,582. I know that some real work has been done to make such a remarkable record as this, and I trust that you will continue to strive to reduce the mining danger to an actual minimum.

I am endeavoring in connection with my daily duties to keep in touch with the conditions of every mine in the state, through reports submitted by the various inspectors of the state mining department. One of the greatest achievements that I would like to bring about during my administration as governor is a material reduction in the death toll as well as the lessening of the number of accidents in the mines of West Virginia.

I recognize the magnitude of your cooperation to this end and the movement for the protection of life as promulgated at Gary is being reflected over all mining sections of the state. It has served to put the protection of human life in the mine within the vale of possibility.

On the whole, our state does not at this time show up creditably with other coal-producing regions when we analyze the fatalities that occur each year. Many causes are given for the terrific death toll. One of the most salient of these is the fact that West Virginia is a new mining state and the development of its coal resources is being carried on extensively at present and in the opening of new mines, new dangers are always lurking. I believe that through a system of education and instruction, whereby the miners may learn to protect themselves, that we will be able to lessen accidents to a marked degree. This you have succeeded in doing at Gary.

Miners and operators alike in West Virginia, I believe, are awakening to the fearful death toll in the mines. This awakening is necessary to reform and this I believe we will soon experience. Such affairs as this in which the means of accident prevention are discussed is one of the best ways to spread the propaganda of safety to every mining community of the state.

I want to assure you of my hearty interest in the continued success of the model mining operations at Gary, and nothing will be a greater pleasure to me than to give my cooperation to your plans for accident prevention.

I reiterate my regret at being unable to be with you on the occasion of your annual banquet. I bespeak for the

officials of the company the greatest degree of success, and for that success the thanks of a grateful people.

(Signed) H. D. HATFIELD.

Charleston, W. V., Jan. 9, 1914.

While the progress in accident prevention for the year 1913 was not as great as was hoped in its beginning, yet a steady progress since the campaign for safety was begun was revealed by the statistics presented. The figures for the year show an increase in tons of coal produced per fatal accident underground over those of 1909 of 250 per cent.; over those of 1910, 130 per cent.; over 1911, 68 per cent., and over 1912, 12 per cent. The number of tons of coal produced per fatal accident, both under and above ground, during the year 1913 showed an increase of over 25 per cent. over those of the preceding year.

During the first months of 1913 no fatal accident occurred, and 1,034,000 tons of coal were shipped. No. 6 works of this company has run 18 months without a fatality. During that time only one serious accident has occurred. This shows that 750,000 tons of coal have been produced and shipped with only one serious accident—a broken leg.

We have long been accustomed to hearing the mines of England and Belgium spoken of as being the safest in the world. The actual records show that the workings of the United States Coal & Coke Co. have a lower death rate than the mines of either of these foreign countries. It will doubtless be a surprise to many people to learn that the death rate in these mines is, per thousand men employed, approximately one-fourth that prevalent among the Gloucester fishermen, and closely approximates the average among the farmers of the country.

Great as have been the strides made in accident prevention in these mines, the end is not yet. No one knows or can guess the actual minimum in the death rate among coal miners from accidental causes. It is the fondest desire and the firm determination of the management of this company to render its mines not only the safest in the United States, or the world, but the safest which human intelligence and persistence can secure.

COLLIERY NOTES

Rivets are not a trustworthy method for securing the gauzes of safety lamps.

There are now five central rescue stations in working order in South Wales and two others in course of formation.

It is satisfactory to find that, notwithstanding the great strides which electricity has made as the hand-servant of the mining engineer, very few accidents are traceable to its use.

In legislating for industrial safety, it is a sound principle to forbid dangerous practices when such a restriction does not thereby entail undue hardship to the community, or, in other words, when the remedy would not prove worse than the disease.

The total coal reserves of the world, compiled from all the reports received, amount to 7,397,533,000,000 tons, of which amount nearly 4,000,000,000,000 are bituminous coals, nearly 3,000,000,000,000 are brown coals of various grades, and about 500,000,000,000 are anthracite.

In selecting a coal-cutting machine, the question of the weight of the machine is one deserving careful consideration. Where the holing is easy and a deep undercut is not required, a light machine will do the work without undue vibration, and it has the advantage of being easily and expeditiously handled, but where deep, heavy work is required, 70 cwt. is not too great a weight for the machine.

The Transition from Inflammation to Explosion of Coal Dust

SYNOPSIS—An explosion is not merely a culmination of progressive combustion but a suddenly developed phenomenon, when the coal as a whole enters into chemical reaction and would so act, even if it did not contain any hydrocarbons. This develops such a center of force that a wave of pressure backs on the zone of inflammation, producing those effects previously ascribed by most writers to suction.

The Altofts gallery, in which the experiments about to be described were conducted, and the instruments employed for determining the necessary data, have been fully described in the "Record" of the Mining Association. It will, therefore, only be necessary here to give a brief account of the manner in which the experiments were made.

The explosion-tube or gallery, as previously stated, was 600 ft. in length and 7½ ft. in diameter. One end was open, and at the other a second tube, 6 ft. in diameter and 158 ft. long, formed a right-angle bend. Then followed short lengths of tube of 6 ft. in diameter, forming a zigzag connection to a chamber in which a ventilating fan was installed. At each angle formed by the zigzag relief valves were hung, and two swing doors were attached on either side of the fan chamber. The general arrangement is shown diagrammatically at the foot of Fig. 1.

The coal dust, obtained by pulverizing nut coal, was spread evenly by hand in the quantity required on the floor of the explosion tube and along wooden shelves, 5 in. wide, five of which, fixed longitudinally above each other on each side of the gallery, extended the whole distance required for the experiment.

Ignition was effected by the firing of a charge of 24 oz. of blasting powder, with 8 in. of clay stemming, from a cannon, pointing toward the open end of the gallery and inclined upward at an angle of about 35 deg.

THE DUST-RAISING CANNON

A rapid air current was drawn through the gallery at the time of the experiment for the purpose of raising the coal dust into suspension. This suspension of the dust cloud was also partly effected by the concussion produced on firing a small cannon charged with 4 oz. of blasting powder and stemmed with 3 in. of dry clay. This "cloud-raiser" was placed 100 ft. toward the open end of the gallery from the point of ignition; it pointed against the side of the gallery and no coal dust was strewn near it.

Note—Second abstract from the fourth report by the British Explosions in Mines Committee on coal-dust explosions. The first abstract was printed in our issue of Jan. 3, Vol. 5, pp. 19-21, under the title, "Concussion as a Cause of Explosions."

DRAFT CONDITIONS

The experiments were carried out in the following manner. The coal dust having been strewn in the gallery and the cannons charged, the ventilating fan was started, both the doors in the fan chamber being wide open so that no air current was drawn through the explosion tube. As soon as the speed of the fan had attained that required for the experiment, these doors were closed by a cord controlled from the firing station, and the air current was thus drawn through the open end of the gallery. The doors when closed completed an electric circuit, which rang a bell in the firing station, and started a seconds clock. Six seconds after the closing of the fan doors the "cloud-raiser" was fired, and the "igniter" was fired two seconds later, the charges in both being ignited electrically.

The explosions as thus produced can be regarded as

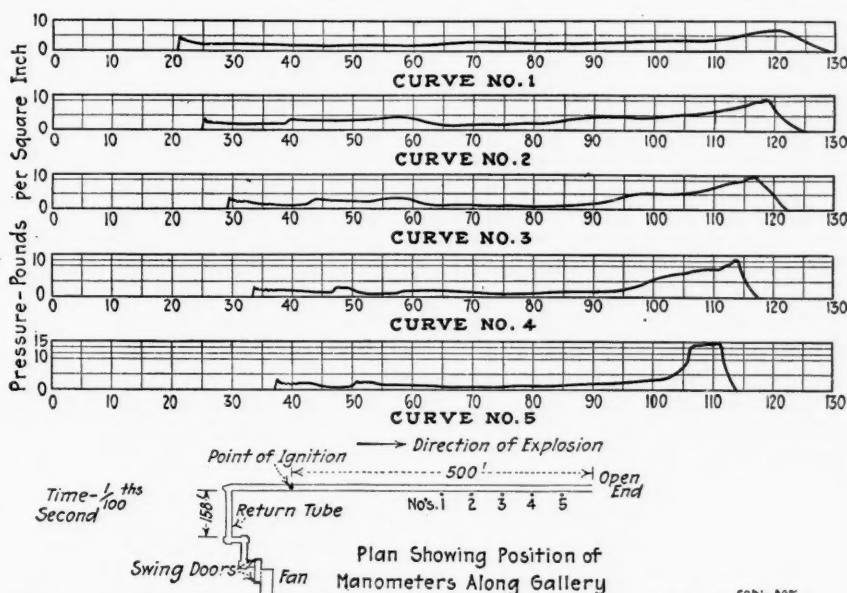


FIG. 1. CURVES SHOWING PRESSURE AT VARIOUS TIMES AS MEASURED BY FIVE MANOMETERS. THE PRESSURES PRIOR TO THE 81ST HUNDREDTH OF A SECOND SHOW THE EFFECT OF CONCUSSION ONLY

taking place in a tube open at one end and closed at the other, for the right-angle bends at the fan end of the gallery greatly retarded the release of pressure and had the general effect of a closed end.

THE AIR CURRENT WEAK AND ITS DIRECTION UNCERTAIN

The fact that the explosive mixture of dust and air had an initial direction of movement contrary to that of the explosion under investigation can be disregarded, for the disturbance accompanying ignition by the cannon reversed the direction of the air-current, which was moving at a speed of about 17 ft. per sec. only. The effect of the air current was, chiefly, to create a more or less homogeneous mixture of dust and air at the moment of ignition.

EXPLOSION DOUBTLESS TRAVELED BOTH WAYS

In describing the experiments made under these conditions, attention will mainly be directed toward what took place between the point of ignition, the position of which along the gallery varied, and the *open* end of the gallery. The fact that inflammation could also travel toward the fan for a certain distance, dependent upon the position of the igniter, must not, however, be overlooked, for there is no doubt but that the pressure thereby produced would affect, to a certain extent, the records obtained of the explosion developed in the opposite direction.

In the experiment now to be described (No. 119, June 9, 1910), which is typical of many similar ones, the point of ignition was 500 ft. from the open end of the gallery, and, therefore, 100 ft. from the junction with the return to the fan. The coal dust was spread on the shelves and floor at the rate of 1 lb. per linear foot, equivalent to 0.4 oz. per cubic foot of air space of the gallery.

This quantity of coal dust, 0.4 oz., is about four times as much as is required for the complete combustion, to form carbon dioxide and steam, of the oxygen in one cubic foot of air. It was the quantity used throughout the experiments recorded in this report.

PRESSURES MEASURED CONTINUOUSLY BY FIVE MANOMETERS

At a distance of 250 ft. from the point of ignition a manometer, or time-pressure recorder (No. 1), was fixed. Four other manometers were also set along the gallery at distances of 300, 350, 400 and 450 ft., respectively, from the point of ignition, No. 5 thus being 50 ft. from the open end of the gallery, as shown in the diagram at the foot of Fig. 1.

Each manometer was provided with a drum revolving at a uniformly rapid speed, so that each gave a continuous record, during the whole time the experiment lasted, of the pressure existing at the particular point along the gallery at which it was placed. Each time-pressure chart was thus a curve in which the abscissae represented times and the ordinates pressures. The principle was, in fact, similar to that of an ordinary barograph.

The series of curves in Fig. 1 are reproductions of the charts thus obtained, the charts being synchronized from the records of pairs of electro-magnetic styli marking on each, one of the pair on each instrument recording the time of ignition and the other showing the speed of revolution of the drum of the manometer.*

The unit of time used in reproducing these curves is $\frac{1}{100}$ of a second, $t = 0$, being the time of ignition, that is, the time when flame issued from the mouth of the igniting cannon. The unit of pressure used is 1 lb. per square inch.

THE CONCUSSION WAVE

The first indication of pressure shown on each curve is that due to the concussion wave caused by the firing of the 24 oz. of blasting powder used to effect ignition. This concussion wave travels, as might be expected, with a velocity approximately that of sound in air at ordinary temperature and pressure. The pressure due to the concussion wave, therefore, appears on each manometer record in succession after an interval of time, dependent

upon the distance of each manometer from the point of ignition.

For example, in curve No. 1 (Fig. 1) the period that elapsed between the time of ignition ($t = 0$) and the first indication of pressure was 20.8 hundredths of a second. The distance from the point of ignition of the manometer that traced this curve (manometer No. 1) was, as stated above, 250 ft. The speed of travel of the concussion wave from the igniting cannon was, therefore, about 1200 ft. per second.

Similarly, the manometer fixed at a point 300 ft. from the point of ignition (manometer No. 2) began to indicate pressure 25 hundredths of a second after the cannon was fired; and so on, each manometer in succession beginning to function 4.2 hundredths of a second after the preceding one, their distance apart being 50 ft.

THE PRESSURES DIRECTLY DUE TO THE FIRING OF THE CANNON

Separate experiments were made with the gallery free from coal dust to determine the magnitude and duration of this "igniter pressure" alone. They showed that when the igniter was placed 500 ft. from the open end (the same position that it occupied in the coal-dust experiment, of which the curves in Fig. 1 are records); curve No. 1 recorded a maximum pressure of 4 lb. per square inch, which appeared 21 hundredths of a second after the cannon was fired and fell gradually to zero after 81 hundredths of a second.

The pressure due to the igniter alone, as registered at manometer No. 1, lasted, therefore, 60 hundredths of a second. Curve No. 5 recorded a maximum pressure of 3 lb. per sq. in., which appeared 37 hundredths of a second after the cannon was fired and fell to zero after 60.5 hundredths of a second. The intermediate curves, Nos. 2, 3 and 4, gave intermediate values.

When considering the curves obtained during the coal-dust experiment No. 119, therefore, it is possible to divide each into two portions. The portions representing conditions prior to the 81st hundredth of a second show the effects of the concussion wave from the igniting cannon; it will be seen that they are all much of the same type. The portions exhibiting the pressures after that time represent the effects of the inflammation of the coal dust.

It is interesting to note that the curves Nos. 2, 3, 4 and 5 record the effect of the concussion wave (from the cannon) which traveled to the "closed end" of the gallery and was reflected back toward the open end. This is shown at time interval 38.5 in curve No. 2, and at time intervals 42.5, 46.5 and 50 in curves Nos. 3, 4 and 5, respectively. This "reflected wave" was traveling at a speed rather faster than that of sound in air at ordinary temperature and pressure.

In curve No. 1 the "igniter pressure" had just died away at the end of 81 hundredths of a second, and from that time onward the pressure developed was due solely to the combustion of the coal dust. The maximum pressure attained is not very great, nor is there any sign of a sudden increase. The same can be said of curves Nos. 2, 3 and 4.

WHERE THE EXPLOSION OCCURS

Curve No. 5, however, which recorded the pressure existing at a point 450 ft. from the point of ignition, presents a different case. A rapid increase of pressure oc-

*Full details of the construction of the manometers and of the manner of obtaining the records are given in the "Record" of the Mining Association (Chapter V).

curs 106 hundredths of a second after the time of ignition, the pressure rising from 8 to 14 lb. per square inch in 6 thousandths of a second. The pressure then gradually increases to a maximum of 16 lb. per square inch, which is maintained during a short time and then falls fairly rapidly to zero as release is obtained at the open end of the gallery.

THE PRESSURE TRAVELS INWARD

This sudden rise of pressure about 50 ft. from the open end of the gallery sends an impulse traveling back toward the closed end, where the pressure was previously comparatively low. For it will be seen that each of the curves Nos. 4, 3, 2 and 1 shows signs of a similar rise of pressure toward its end, the order in point of time in which these "peaks" make their appearance showing that the impulse is traveling along the gallery from the open end toward the closed end; that is to say, in an opposite direction to that of the inflammation.

The progress of the inflammation, as indicated by the pressure developed, is perhaps more clearly shown by the curves in Fig. 2. These curves have been prepared from those in Fig. 1, each separate graph representing the state of pressure along the gallery, over the distance lying between the first and the last manometer, at successive hundredths of a second beginning 95 hundredths of a second after ignition. Pressures are represented by the height of each part of each curve above its base line.

A DIAGRAM SHOWING RELATIVE PRESSURE AT 25 SUCCESSIVE INSTANTS

By comparing these successive diagrams one with another, the progress of the inflammation along the gallery can be studied; for each successive diagram, as the eye follows them in order, represents a pressure condition one-hundredth of a second later than the previous one.

On examining the successive diagrams, the manner in which the region of maximum pressure changes in position, traveling toward the open end of the gallery, can readily be seen. A sudden increase in the steepness of the curves appears between time intervals 106 and 107 (i.e., between 106 and 107 hundredths of a second after ignition); while the release of pressure between time intervals 110 and 111, followed by the movement of an impulse toward the closed end, is well marked.

Some idea can also be obtained from the curves in Fig. 1 of the speed of travel of the inflammation along the gallery. At time interval 95, the maximum pressure was at a point 350 ft. from the point of ignition; by the time the maximum is indicated 50 ft. further on, 6 hundredths of a second have elapsed, so that the speed of

travel over that 50 ft. was about 830 ft. per second. Similarly, the average speed over the next 50 ft. was about 1000 ft. per second.

THE INCREASE IN PRESSURE IS FAR GREATER THAN PROPORTIONAL TO DISTANCE TRAVELED

Neither the speed of travel nor the maximum pressure attained can be called great. There is, however, a progressive increase in both as the inflammation proceeds toward the open end of the gallery. A comparison of the maxima recorded at different points along the gallery, as determined from Fig. 1, shows very clearly the cumulative increase of pressure with increased travel:

RELATION OF PRESSURE TO TRAVEL OF EXPLOSION

Distance from point of ignition, ft.	Maximum pressure, lb. per sq.in.	Increase per 25 ft. travel, lb. per sq.in.
350	4.5	
375	5.5	1.0
400	6.5	1.0
425	10.0	3.5
450	16.0	6.0

In the foregoing experiment what has been defined as "explosive combustion" had just begun after the inflammation had traveled about 425 ft. This is deduced from the fact that a sudden access of pressure at that point is indicated on the curves, previous experiments having shown that a sudden access of that nature only occurs when the combustion of the dust takes place as a whole.

THE GAS PROPAGATION THEORY OF COAL-DUST EXPLOSIONS NOT TRUE

The idea seems to have been prevalent that the percentage of volatile constituents that a particular coal dust contains is a direct measure of the explosive properties of that dust.

The explanation usually given for this assumption is that the gases derived by distillation of the dust by the source of ignition are the real agents in propagating combustion. According to this view, distillation of inflammable gas must first take place, and it is that gas mixing with air that forms the "explosive mixture." Hence it is concluded that any dust that yields only a small proportion of inflammable gas on heating, or from which the gases are driven off with difficulty, should give only moderate explosive effects; and a dust that yields no gas at all should, according to this view, be incapable of propagating explosion.

Neither of these two assumptions is upheld by experiment. A coal dust containing 16 per cent. of "volatile matter" caused an explosion as violent as one containing 35 per cent., while wood charcoal produced an explosion as great or even greater.

CARBON "GAS"

In our view there is nothing to conflict with the belief that coal dust, when suspended in a sufficiently finely divided state in air, acts somewhat like a "coarse" gas, the aggregate of molecules contained in the one particle of dust corresponding to the single molecule that takes part in an explosion of a combustible gas and air, the heat energy necessary for propagation of explosion being derived from combustion of each dust particle as a whole without any appreciable preliminary distillation of gas therefrom.

In other words, heated oxygen molecules coming into collision with the combustible dust particles, form highly heated carbon dioxide and steam molecules, which, in

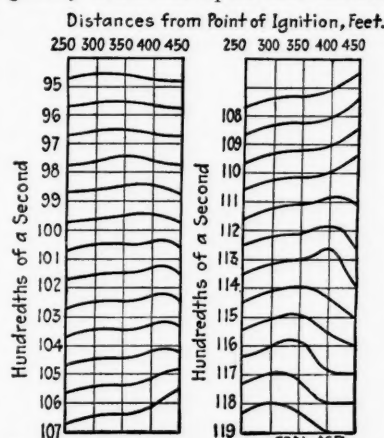


FIG. 2. THE FLUX OF PRESSURE

A series of 25 diagrams showing separate pressure readings at 25 periods of time exhibiting, as in a moving picture film, the variations of pressure. The pressure summit at 0.95 sec. is at the manometer at 350 ft.; at 1.06 sec. it has moved to 450, at 1.19 sec. it has traveled back to 300. Thus the balance of pressure is first outward, then inward.

turn, transfer their energy, directly or indirectly, to other oxygen molecules and unburnt dust particles and so propagate the flame. According to this view, any finely divided dust which can be burned is capable of propagating explosion.

DISTILLATION OF GAS IS SLOW

Many considerations favor this opinion. The rapidity with which explosive combustion (as distinct from inflammation) is propagated in coal-dust and air mixtures is hardly compatible with the notion that distillation of gas must necessarily first take place, and that it is the heat energy derived from the combustion of that gas which is chiefly responsible for the explosive effects. Such a distillation requires an appreciable time and absorbs energy.

If, in the propagation of flame, the time required to raise the dust and air mixture to the ignition temperature allows appreciable distillation to take place and the inflammable gases thus evolved are burnt in preference to the entire dust particles, then analysis of the products of explosive combustion should afford proof of it.

Preferential burning of the "volatile constituents" of the coal dust would result in the production of a smaller proportion of permanent gases (carbon dioxide and carbon monoxide) than would be given by combustion of the dust particles as a whole; for the "volatile constituents" contain a larger proportion of hydrogen than does the whole coal substance.

AN EXPLOSION OF DUST PRODUCES PROPORTIONALLY LESS STEAM THAN WOULD AN EXPLOSION OF ITS GAS

No evidence has been obtained of such a preferential burning of the "volatile constituents" in those experiments where *explosive combustion* has been attained. On the contrary, the gases withdrawn (just after the flame has passed*) have always shown a ratio

$$R = \frac{\text{oxygen present as oxides of carbon}}{\text{oxygen present as steam}}$$

in agreement with the ratio required for combustion of the dust particles as a whole, as determined from the chemical composition of the dust.

Samples withdrawn during the preliminary period of comparatively slow *inflammation* do indeed show that in this stage, there is a preliminary distillation of gas from the dust, and, as explained in a previous report; it is the ease with which such distillation is effected that mainly determines whether a particular dust is capable of propagating *inflammation* more or less readily.

THE SUDDEN RISE IN PRESSURE

The transition from comparatively slow inflammation, during which distillation of gas takes place as a preliminary to burning, to explosive combustion, during which each dust particle that aids in propagating the flame is burnt as a whole, appears to be well defined. It is characterized by a sudden rise of pressure, the change from low to high pressure taking place as the flame travels only a few feet of distance (see curve No. 5, Fig. 1). When no such "peak

*Subsequent to the passage of the explosion along the gallery, the heated products of combustion effect the distillation of gas from excess coal dust—coal dust which has not assisted in the propagation of flame—and if an auxiliary supply of air enters the gallery and mingles with this gas, a secondary explosion (of gas and air) may take place.

of pressure" occurs, as, for example, when the distance of travel has been insufficient, analysis of the products of combustion shows that preferential burning of the volatile constituents of the dust has taken place; after this rise of pressure has occurred no such preferential burning can be detected.

It is for this reason that we consider it necessary to draw a line of demarcation between "inflammation" and "explosive combustion" of coal dust and air mixtures, the difference, though mainly, of course, one of degree of rapidity of combustion, being also one of character.

✽

Annual Meeting of A. I. M. E.

The annual meeting of the American Institute of Mining Engineers will be held Feb. 17-20, 1914, at its headquarters, 29 West 39th St., New York City. All indications point to a very active and important meeting. Several interesting coal papers will be presented. Alexander Bowie will read a paper entitled, "The Burning of Coal Beds in Place." F. Donaldson is to present a paper on "The Injection of Cement Grout into Water-Bearing Fissures." George Otis Smith has a paper on "Disposition of Natural Resources." Another interesting paper will be presented by William Kent, and will deal with "Classification and Heating Value of American Coals."

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Canadian Mining Institute

The 16th annual meeting of the Canadian Mining Institute will be held in Montreal, Can., Mar. 4, 5 and 6. The headquarters will be the Windsor Hotel. Among the many papers already promised are the following, which should be of interest to coal men: "Factors Influencing the Cost of Power for Mining Purposes," by J. M. Forbes, of Montreal; "Mining in British Columbia," by Howard W. Dubois, of Philadelphia, Penn.; "Coal Resources of the World," by D. B. Dowling, of Ottawa, Can.; and "Safety in Coal Mines" (illustrated by moving pictures), by a representative of the H. C. Frick Coke Co.

BY THE WAY

It is easier to be critical than to be correct.

In the spring the miners' fancy lightly turns to thoughts of strikes.

Applause is the spur of noble minds, the end and aim of weak ones.

Where doubt is, there stands truth, for doubt is the shadow of truth.

The man who has two strings to one bow may shoot strong but not straight.

Every man loves justice at another man's expense; few care for it at their own.

A "hard-boiled" (derby) hat is one of the best protections there are against the mine trolley wires.

Let a defect, which is possibly small, appear undisguised. A fault concealed is presumed to be great.

They say that money talks. Judging from the commotion out in Ohio coal fields it must be getting ready to say goodbye to someone.

Editorials

What Your Coal Is Worth

It will perhaps create some opposition to state that the owner of the mine usually realizes better than his superintendent and his foreman what his coal is worth. It is this knowledge which makes the operator so keen about coal waste and so excited about the suggestion of a squeeze.

To most men the value of the coal in the hill is the sum of the prices paid for the coal area, divided by the number of tons thus purchased. To the business man the value is far greater. Before a coal property is bought at perhaps as little as \$25 to \$50 per acre, the company making the purchase often spends on surveys, drilling and legal expenses five and perhaps more additional dollars for that same unit of area.

These initial expenses should be added to the cost of the coal, and that figure must be increased a certain amount for the value of the improvements, if the coal seam is likely to be exhausted before the mine is worked out. Of very few mines can it be said that their life is longer than the presumed life of the bulk of the equipment.

The coal value must be loaded with this charge. It is true that it is customary to add amortization charges, depreciation and obsolescence to the annual deductions from revenue, and it may be well said that it cannot be also charged against the coal *as coal* in such an accounting. But in investigations to ascertain the question of the appropriateness of certain expenses to save coal, such a method of appreciating coal value is to be approved.

Another charge which is appropriate is one for headings driven and for drainage. The work is already done and has been paid for; to make it of no avail is to waste the money thus expended. Moreover, the wasting of coal involves a hastening of a number of expenditures which might otherwise be delayed. Rail, pipe and electric wire will probably have to be bought in quantity very little different, whether coal is wasted or not, but the time of purchase and the depreciation consequent thereon will be increased if coal is left in the pillars.

In fact, many superintendents who declare that methods such as have been practiced in the Connellsville, Pocahontas, Georges Creek and Fairmont regions would have ruined them, if put in operation in their fields, have already thrown away more heading development than would have sufficed, if economized, to put such methods into effective operation. We have noted old mines where more good heading has been thrown away than would have started two mines in the Pocahontas region along the lines required by the Pocahontas Coal & Coke Co. of all their lessees.

We leave it to our readers to value their own coal correctly. The items are so various that an estimate for mines generally would be misleading, but it must always be remembered that the values bear no close relation to the price paid to the farmer for his land. Railroad cost may be the largest element at some mines, the plant may

be the big item at another, and in a third with few improvements and low coal the heading and drifting cost may be the leading item.

The value of coal in the hill is a subject well worthy of consideration, for on its determination depends the successful operation of the mine. Many a man has become bankrupt through his economies.

✂

Nystagmus

It is a remarkable fact, not chargeable, we believe, in any large degree to malingering, that in the British Isles 1819 cases of nystagmus were carried over from 1911 to 1912 and that in the latter year 1376 cases received compensation for the first time.

The disease has spread with startling rapidity in a country where the mining conditions have not markedly changed. The mines have been worked with safety lamps for many decades; for centuries men have lain on their sides and undermined coal. In view of the new development of the disease, neither of these causes can be regarded as reasonable sources of nystagmus though it has often been ascribed to their influence.

If imperfect light is the cause, why does the disease get more frequent as the light given by lamps increases? We have progressed from the firewheel to the Davy and Geordie with their metal-shaded flames and deficient light-insuring draft. From that we have reached lamps with glass cylinders through which the full light of the flame is secured and draft is perfected. We have changed oil for naphtha and in some cases installed electric lamps but, with all our changes, nystagmus appears to have increased.

We believe we are right when we assert that nystagmus is unknown in the United States. If so, why does not nystagmus occur here, for we have safety lamps exactly similar to those which have been accused of doing so much harm in England? Why are the conditions so different across the intervening ocean? It may appear bold to suggest in absence of proof that nystagmus is a germ disease and propagates more freely in deep mines than in those that are shallow. But such an interpretation of the facts appears quite reasonable.

It seems that the depth of the mines and their consequent high temperature is the cause of the ankylostomiasis scourge in Europe. Perhaps their shallowness here keeps the United States immune. However, that disease seems not to spread on the outside of the mines in Europe, while some cases of nystagmus have occurred in others than miners in England. Here, therefore, the parallelism is not complete.

Nystagmus, as an English court has said, is rather a symptom than a disease and in discussions of its character the symptoms rather than the basal disorder are considered. If it were a newly discovered *cause* like appendicitis and not a newly found symptom, we might believe that it existed years before it was listed as an ailment.

But we cannot believe that a *symptom* did so exist, and we must, therefore, favor the idea that nystagmus is of recent origin. Consequently we are justified in our belief that it has rapidly spread and is not an old ailment which merely suddenly sprung into discussion as a result of scientific research and the fostering care of the Workman's Compensation Act.

We can remember how the story that the South was a hot bed of ankylostoma aroused the whole country. It seemed unlikely that a parasite, of which few had even heard and which was unknown at the beginning of the last century had done so much damage to a people as proud and as capable as the mountaineers of the Southern States.

Perhaps we will find that nystagmus is similarly caused, probably, however, not by a nematode, but by some lower organism, and will have a similar spread wherever favorable breeding conditions exist. For the description of nystagmus seems such that we can hardly conceive of it as a disease of the eye, but rather as a muscle or nerve trouble of a specialized kind and of extreme severity, brought on by a specific germ.

§

The Mining Industry and the Public

Almost all miners live in rented buildings and not in their own homes. While better paid and better housed than the tenantry of Europe, their economic condition is really in no great degree different. Such men have no reserves of any kind. Idleness and penury are with them synonymous, and discontent is inevitable. Nor is the argument that, all men could save if they would, one which appeals with any force. It does but excuse the coal operator morally; as a reasonable being who desires content as an adjunct to successful industry and as an assurance against syndicalism, the sense that he is *morally* justified is not sufficient.

The new propaganda for the destruction of capitalism of all kinds will be fostered by our creating large aggregations of people who have no reserve capital, who after periods of comfortable living are by reason of strikes and industrial irregularities frequently plunged into the most bitter poverty. The "new unionists" declare such people have "nothing to lose but their chains." They have indeed something to lose, to wit, that industrial activity and the advantages created by the accumulated capital of many years which make possible the cheap production of articles of utility. Let either be destroyed, the earning power of all of us is reduced to a minimum.

But they have no capital to lose. In this they are absolutely right, and it is not well for us to forget that in a camp full of workmen, not owning a foot of land, a single stick of timber or a brick, we have a condition which may easily become a menace.

It is true that hitherto there has not been a great demand on the part of miners to furnish their own homes; on the other hand, such a desire as existed has not been encouraged. It has its economic disadvantages, it is true. It has on occasion extended strikes, for men owning their homes are better able to withstand the stress of idleness, especially where they have both houses and farms.

Perhaps temporarily the operator is better off with "tenantry" instead of "yeomanry," if we may transfer and slightly strain those words, but the nation and ul-

timately the operator will suffer if the stake of the citizens in the prosperity of the nation is reduced. In fact, the coal operator is before all a citizen, a most important citizen, we think, and if he continues to create barracks, however exemplary they may be, he will help to form a new United States, composed of two classes only—the plutocrat and proletariat.

No nation has been successful long without a middle class. It may have failed to recognize that it had a linking body of citizens, but they were there nevertheless.

These facts are given emphasis by the Indianapolis convention, where the United Mine Workers of America entertained a resolution opposed to the militia, which is used to protect property such as the mine workers, for the largest part, do not possess. The modern unionism and the new industrialism join in condemning the militia and the state constabulary because they prevent acts contrary to the law. They do not desire a reform of these bodies, but oppose their very existence.

In Europe the same condition exists. Tom Mann served nine months in jail for endeavoring to seduce the military forces of Great Britain, and in France the syndicalists have paid a stipend to every soldier in the army, a sort of bribe to keep him friendly to their aims and considerate to them in the breaches of the law which they quite openly advocate.

Let the operator remember that every town of tenantry is a menace to the body politic, which he should strive to convert into a village of homes as rapidly as he can.

§

The Ethics of the Mine Cave Problem

A remarkable suggestion, according to the Scranton (Penn.) press, was made at the annual meeting of the Board of Trade of that city, Monday evening, Jan. 19, 1914, and promptly adopted with but a single dissenting vote.

The author of the suggestion, "speaking as a mining engineer of forty years' experience," is quoted as stating that the city has suffered a depreciation of \$25,000,000 in property values by reason of the publicity it has received concerning mine caves.

The suggestion was put in the form of a motion, to the effect that newspapers should be requested to "soft-pedal" the news of mine caves. To the credit of one man, the head of a local coal company, COAL AGE is proud to say, a strong appeal was made in opposition to the motion—a plea for *honesty and integrity* in all business dealings and transactions.

The suggestion, though approved by the Board, will not receive the indorsement of responsible mining engineers, whose ethics are too sound to permit their profession to be disgraced by an acknowledged concealment of facts that concern the public good and safety.

In just and equal dealings of this nature, there is nothing to hide from public print, and we opine that no paper loyal to the reading public will withhold what it is the public's right to know. The time of domination is rapidly passing; and the right of the people to rule has never been more strongly upheld than it is today. Let right prevail; let the interests and the people of Scranton get together and prosperity for the great anthracite valley will be insured.

The Policy of Hush!

A prominent member of the board of trade of the city of Scranton, at the annual meeting today declared that the real estate of the city had decreased 25 per cent. in value because the newspapers gave too much space to mine caves. He presented a motion that the newspapers be requested to suppress all sensational news regarding surface disturbances. The motion carried, only one dissenting voice being heard.—"Scranton Truth," Jan. 19, 1914.

The above news item suggested the following:

What if a settling breaks a main,
Spreading death in the unleashed gas,
Firing the houses in its train,
Burning all to a shapeless mass?
Handle the news with care and tact,
Quite as a decent person should.
Bury the knowledge of the fact;
Keep it mum, for the common good.

Only the fool, with disordered brain,
Still gives vent to the outworn creed
"We are the victims of lust for gain,
Sacrificed to the god of greed."
Only the traitorous and the weak
Dare to tell, to the city's shame,
That which the loyal scorn to speak.
Keep it mum, or you'll soil our fame.

What if the schools and churches fall,
Shattered wrecks on the shaken sod?
These are the things that we ought to call
Signs of wrath from an angry God.
What if the bottom drops clean out,
Letting a city block go down?
Don't go telling the tale about;
Keep it mum, or you'll hurt the town.

What if a flimsy shack or two,
Roofing a litter of dirty wops,
Splits and vomits its frightened crew
After the surface quakes and drops?
Why should a fevered, frantic fuss
Over a thing like that be made?
Can't you see how it injures us?
Keep it mum, or you'll kill our trade.

Kingston Coal Co.'s Improvements

The Kingston Coal Co., at its No. 4 shaft, in Edwardsville, has established a surgical operating room. The intention is to perform operations in this building before moving the patient to a distant hospital or his home. An abandoned storehouse has been reconstructed so as to serve the purpose described. This work alone will cost over \$1000.

SURGICAL OPERATING ROOM

The main compartment will be known as the "first-aid room." It measures 22x24 ft. and like the other rooms it has been floored with cement, and the floors, ceilings and walls have been covered with an enamel paint which permits of sanitary cleansing. The first-aid room will contain an operating table, operating chairs,

sterilizers and instrument cabinets, all of steel and coated with white enamel. Adjoining this compartment is a bathroom with tub, shower and foot baths, basins, etc., and adjacent to both is a locker and supply room. All fixtures are portable so as to permit moving the furniture for cleaning. The building is heated with steam and lighted by electricity.

One man will be always in attendance and no one else will be admitted as this exclusion is necessary to maintain asepsis. Dr. D. H. Lakes will be summoned as soon as a man is injured in the mines and he will be at the hospital before the man arrives at the surface.

BATHHOUSES

A description of the washhouse at No. 1 shaft of the Kingston Coal Co. will be of interest, as it is typical of those at other plants of the corporation. There are three rooms, one equipped with baths and two with clothes lockers. In the bathroom are 36 cement bath tubs, 12 basins and 6 showers.

The company is renovating their houses, which are being made spacious and airy and are being equipped with baths. Many of the sidewalks are being paved and the company has taken part in many of the town improvements at its own cost. It is largely through aid given by the coal company that the work of the Visiting Nurse Association has been made so extensive. Eventually a lecture hall for instruction in first aid, mining and other educational work will be built.

✽

Recent Legal Decisions

Assumption of Risk by Miner—A mining company is liable in damages for death of a miner resulting from negligent failure of the company's inspection officers to discover the necessity for timbering the roof from which the rock fell which caused the accident, but there is no such liability if the miner's own work created the dangerous condition, and he remained at work knowing the hazard. (Kentucky Court of Appeals, Cooke-Jellico Coal Co. vs. Richardson's Administratrix, 161 Southwestern Reporter 537.)

Abandonment of Rights Under Lease—A lease in favor of a coal-mining company, giving the company the right to explore for and mine coal, if found in paying quantities, upon certain conditions, did not give the company such vested right in the coal in place as prevents a finding that it abandoned its rights under the lease, though the period within which an ordinary action to recover an interest in land might be brought had not expired. Whether the lease was abandoned depends upon the intention of the company and the surrounding circumstances of the particular case. (Iowa Supreme Court, McColl vs. Bear Creek Coal Mining Co., 143 Northwestern Reporter 532.)

Liability for Injury to Miner—The rule of law that an employer is not responsible for the safety of a place to which an employee's duties do not take him cannot be extended to exempt a coal-mining company from liability for injury to a miner, caused by the fall of rock from a mine roof at a place which he was passing in returning tools borrowed from a co-employee, although the miners were required to furnish their own tools; it appearing that the company knew of, and had not disapproved, a custom of miners to borrow tools from each other. (Iowa Supreme Court, King vs. Mendota Coal Co., 143 Northwestern Reporter 539.)

Effect of Iowa Mine Law—Where the operator of an Iowa coal mine has control of the entries of the mine and certain employees are by custom required to repair any defects in the same, the operator is liable for injury to another employee resulting from negligent failure to keep the entries in a reasonably safe condition; miners being required by the Iowa mine law to prop or support the roof of only such entries as are under their control, respectively. (Iowa Supreme Court, Carnegie vs. Crescent Coal Co., 143 Northwestern Reporter 550.)

The Underwood Colliery

The Underwood Colliery of the Penn. Coal Co. at Dunmore, Penn., is expected to be ready for the shipment of coal in the spring of 1914. It is designed to ship 3000 tons of graded coal per day. There are 9 beds of coal of good quality, and it is figured that there is coal sufficient to permit of operation for 50 years. Shaft No. 1 has 4 cageways, and all the coal will be



UNDERWOOD No. 3, FOR LOWERING MEN AND MATERIAL, FOR PUMPING AND VENTILATION

hoisted at that point. Shaft No. 2 is for hoisting men and for an airway. Shaft No. 3 is for the same purposes and for pumping, and lowering supplies. There is also to be a fourth opening, a slope, by which only supplies will be delivered.

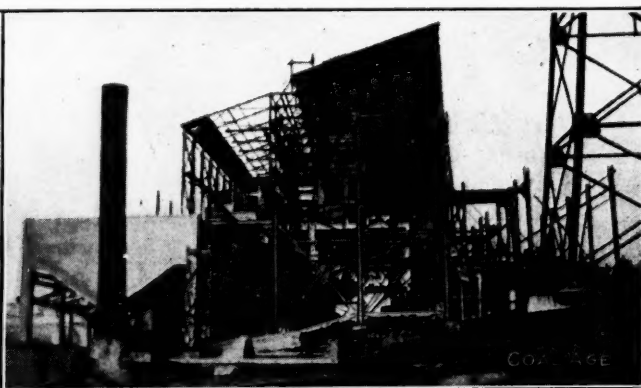
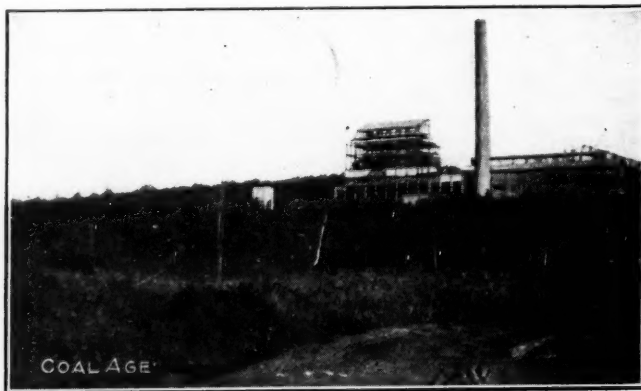
Twenty double houses are being constructed to house 40 families. The street on which they front is paved, and each house will have a sidewalk and shade trees. The rooms will be lighted by electricity. Each half of each double house will have 6 rooms, a closet and a sink. There will be two bathhouses, one for the women and the other for men. These will be kept clean by a caretaker appointed by the company.

There are 8 single, plastered-frame houses for the foremen. W. A. May is general manager, and W. W. Inglis, general superintendent.

More Rescue Maneuvers

The car of the Bureau of Mines which was stationed for three months at Fairmont, W. Va., has been moved to Uniontown, Penn., and at Revere an abandoned slope has been offered the rescuemen at which maneuvers like those at Chiefton, W. Va., can be practiced. The car is in charge of E. Steidle and C. W. Riggs, the latter being the first-aid instructor. Two rooms in the old Y. M. C. A. building on East Main Street, Uniontown, are being used as training headquarters, and are temporarily equipped with 10 sets of breathing apparatus.

The slope at Revere which belongs to W. J. Rainey, has been fitted for the training work by the bratticing off of a section of the mine about 400 ft. long. In this section a dense smoke and harmful gases will be formed by burning wood. The companies sending teams are the Tower Hill Connellsville Coke Co., Consolidated Connellsville Coke Co., Oliver & Snyder Steel Co., Coal Department, Republic Iron & Steel Co., Coal Department, W. J. Rainey and the Puritan Coke Co.



UNDERWOOD COLLIERY BOILER PLANT AND BREAKER



A NEW VILLAGE IS BEING BUILT WITH PAVED STREETS. THE ILLUSTRATIONS SHOW THE FRONT AND REAR OF THE HOUSES RESPECTIVELY

Discussion By Readers

Working Coal under Watery Strata

Letter No. 2—Replying to the inquiry of Geo. MacPhail, COAL AGE, Jan. 3, p. 30, I will answer the questions in the order they are asked, giving my own experience under similar conditions. It may be stated, however, that the data given in the inquiry are scarcely sufficient for the satisfactory solution of a question of so much importance.

The first question asked, If the coal is taken out to such an extent as to break the sandrock, would it be reasonable to expect the same inflow of water as was experienced in sinking the shaft? In reply to this question, I would say that my own experience is that if the roof was fractured only, and no cave took place, although the flow of water might be considerable at first, it would gradually diminish and, in some cases, might cease altogether. The impervious nature of the bed lying above the coal and underneath the sandrock will, in many cases, close the fissures as the strata settles. Should a heavy cave occur, however, the pressure of the water might be sufficient to cause a further fall that may extend to the sandrock. In that case, the inflow of water would probably be as great as that encountered in sinking the shaft. In my opinion, the question of the measures breaking up to the sandrock seems to be a more important matter than the breaking of the sandrock itself.

The second question asked, Would it be advisable to leave in a possible 50 per cent. of the coal as pillars to support the roof, in order to prevent the breaking of the sandrock. In answer to this question, I would advise leaving 50 per cent. of the coal or whatever is necessary for the proper support of the roof. I would suggest that working this seam on the panel system would be advantageous and present opportunities for testing the amount of coal that can be safely taken out in the first working, besides affording ample means of damming off any section in which an inflow of water might occur.

The third question asked, Will the proposed hoisting shaft sunk 300 ft. away from the airshaft make the same amount of water? In reply, I would say should a fault exist between the two shafts, it is possible for the second shaft to pass through practically dry ground, assuming the source of the water supply to lie on the other side of the fault. Otherwise, however, it is probable that the same quantity of water will be met in sinking the second shaft, as in the first shaft sunk. But a sharp rise of the measures toward the second shaft might reduce the volume of the flow.

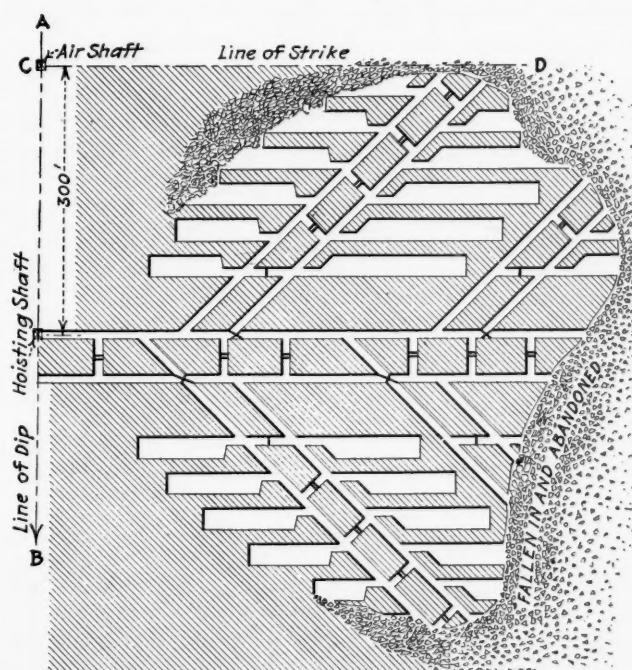
JOHN E. SPICER.

Cumberland, B. C., Canada.

Letter No. 3—The data given by Geo. MacPhail, in his inquiry, COAL AGE, Jan. 3, p. 30, are so meager, that it will be necessary to make several assumptions, which may or may not be true in his case. However, assuming that no unusual amount of water was encountered be-

fore reaching the sandrock when sinking the airshaft, it may be inferred that this stratum is the natural channel for the water entering it at the outcrop or along the line of some geological formation, and that the sandrock bed forms a natural reservoir for whatever water percolates through the overlying strata.

In answer to the first question asked, I will assume that the dip of the seam is in the direction *AB*, indicated by the arrow in the accompanying figure, and the line of strike *CD* perpendicular to the dip *AB*. Assuming, further, that the seam is developed by driving the main entries on the line of strike or parallel to *CD*, and that



ILLUSTRATING SUGGESTION ON DRAWING PILLARS ON THE RETREATING PLAN

cross-headings are turned at an angle to the left and right of the main headings, and rooms are driven off these cross-headings, when the first break occurs in drawing back the pillars on the retreating system, as shown in the figure, an increasing inflow of water may be expected in the dip workings or those lying below the main entries where the break advances toward the rise. On the other hand, a decreasing flow of water would naturally be expected in the rise workings or those lying above the main entries where the line of break is advancing toward the dip.

The reasoning on which I base this opinion is that in the rise workings, the first break would produce the maximum flow of water. Following this, each successive break made in the roof by the retreating pillars, would produce only the water stored in the sandrock directly over that joint. In other words, the first break, occurring to the rise of the pillar workings, would cut off the subsequent inflow of water from the strata higher up the

pitch; while, in the dip workings, the reverse of this is true and the inflow of water would increase with each successive break.

Replying to the second question asked, I would say that since the airshaft is making nearly one-half of the assumed pumping capacity, good judgment would dictate leaving in sufficient pillar coal to support the roof and prevent a cave. If the workings are of any considerable extent, it would only take a small additional inflow of water to overtax the capacity of the pumps and, therefore, any serious break in the sandstone would result in the flooding of the mine. In order to prevent the loss of a large percentage of coal, under the conditions named, it will be necessary to adopt some method of support of the roof that will be equally as effective as the pillar coal left in the first working.

In the working of a thin seam of coal, under similar conditions, we adopted the plan of driving four rooms in a range of 32 yd., leaving a 4-yd. pillar between each range or block. By the time the rooms were driven up their proper distance (75 yd.), this pillar had grown much less. It was necessary to take down roof or lift bottom on the roads; and this material was thrown into the waste on each side of the road, but no particular care was taken to build packs. The roof varied from slate to fireclay in different portions of the mine, and the seam was underlaid with a stratum of hard fireclay interspersed with ironstone. The roof settlement, in this system of mining, was uniform and falls were rare. Even these could have been prevented, had proper care been taken in building packs. In mining a seam of the thickness mentioned by Mr. MacPhail, the waste material produced in driving the entries could probably be used to good advantage in building the packs required in the rooms. The method of culm flushing, as used in the Pennsylvania anthracite region, is worthy of consideration in this connection.

Replying to the third question asked as to whether the proposed hoisting shaft will produce the same quantity of water as the airshaft, permit me to state that, in my opinion, this will depend upon the location of the second shaft with respect to the first. My experience, in this regard, has taught me that if the second shaft be sunk on practically the same line of dip as the airshaft and below the latter it will not make the same quantity of water, for the reason that the water flowing into the airshaft cuts off, in a large measure, the water that would otherwise drain into the second shaft. If, however, the second shaft is sunk to the rise or to one side of the airshaft, practically the same flow may be expected.

I. C. PARFITT.

Jerome, Penn.

Letter No. 4—Replying to the inquiry of Geo. MacPhail, I want to suggest a plan that we have found to work successfully in the gas and oil sandrock in Oklahoma. Although the conditions are somewhat different from those described by Mr. MacPhail, I believe the same method could be employed to advantage in his case also. I have sunk a shaft through quicksand that had to be frozen before we could pass through the stratum. Also, I have seen 14x16-in. oak timber crushed when mining under water-bearing strata.

My suggestion is as follows: If possible, find a basin not far away from the proposed location of the hoisting

shaft. Drill a 10-in. hole to the sandrock in this basin and shoot the hole with some high explosive. We use for this purpose about 90 qt. of nitroglycerin, in holes 1200 to 1500 ft. deep. In the present case, the hole being, say 150 ft. deep or less, I would suggest using about 25 to 30 qt. of the explosive. The effect, I believe, should be the same as that produced in our sandrock, which is very hard. The force of the blast should open up the water strata and, perhaps, cause the well to overflow at the surface; but if not, a pump can be used to handle the water and drain the territory in the vicinity of the shaft. The question may properly be asked, Would such a blast shatter the strata between the sandrock and the coal? I do not believe that it would, as my experience is that while this explosive will crack shale, it pulverizes rock and granite, which is of a coarser grain.

In reply to the second question, I would say that, inasmuch as there is a bed of shale beneath the sandstone, interstratified with slate and fireclay, this should be sufficient to keep the water from penetrating to the seam, assuming, however, that proper precautions are taken in mining the coal. Due care should be taken to prevent a cave of, say over 40 or 50 ft. Under ordinary conditions, a shale roof will not cave higher than 30 ft., but will arch over and form a natural support for itself.

The answer to the third question will, in my opinion, depend on the extent to which the drillhole, mentioned, drained the territory in which the shaft is sunk. The manner of shooting this hole is as follows: The explosive is lowered into the hole in cans, by hand or winch, using a double cable fastened to the explosive by a slip noose, so that the cable can be released and drawn from the hole when the charge is at the bottom. The charge is then exploded by dropping a weight or heavy iron bar into the hole. A chisel-pointed bar, called a "go-devil," 4 ft. long and made of 7/8-in. drill steel, is sometimes used. At times, the hole is fired by dynamite, using insulated wires and a blasting battery.

H. GEDOSH.

Poteau, Okla.

The Certificate Law

Letter No. 14—I have noted with interest the wide difference of opinion expressed in reference to the mine foreman's certificate, issued in different states. For my part, I fail to see why a man who holds a certificate of competency to act as mine foreman in Pennsylvania, should have to pass an examination in another state before assuming a similar position therein.

A number of arguments have been advanced to the effect that the conditions differ so greatly in the different states, that no matter how good a man may prove to be in the management and control of a mine in one state, he must begin at the bottom and learn the business again, which seems to me absurd. Coal is coal whether here or in China, and the manner of formation of the deposit is practically the same. While some seams may be thicker or somewhat more inclined in one state than in another, it must be remembered that the same differences occur in the districts of a single state. There is the same variety of conditions in the state of Pennsylvania, in respect to coal mining, as exists in any two states in this country. In my opinion, it would be just as absurd to require a man who has been acting as mine foreman in Clearfield County

and desires to take a position as foreman in the Pittsburgh district, to obtain a new certificate before assuming the duties of that position.

Again, many men have gone from Pennsylvania into other states to act as superintendents and are not required to procure certificates and yet they seem to produce good results. In general, the conditions of mining are much the same in one state as another; the mine gases are the same; roof conditions, methods of ventilating and draining the workings; methods of timbering and systems of haulage differ in no material way. In some states, the coal is "shot off the solid"; but that practice is fast disappearing, except in the anthracite region. The greatest difference may be and probably is in the methods of working employed; but no state has a hard-and-fast rule in this regard; and, generally, the mine foreman must work to a plan that has been laid out and adopted by the management.

I fully agree with Mr. Clark, Letter No. 10, COAL AGE, Jan. 10, p. 100, except where he says that a mine foreman should undergo an examination every three years. I would like to ask, what would a doctor, a lawyer or anyone who has passed a civil-service examination think if they had to pass such an examination every three years, in order to keep abreast of the times? I consider that the mine foreman who does not take sufficient interest in his work to keep himself posted on the best means and methods employed in mining, without being compelled to do it through the possible loss of his certificate, is unfit for the position.

THOMAS HOGARTH.

Heilwood, Penn.

Letter No. 15—Referring to the discussion of the certificate law, there seems to me much wisdom expressed in the letters of R. J. Pickett and Geo. N. Lantz, COAL AGE, Dec. 27, pp. 987-8. Of special interest is the suggestion of Mr. Lantz, that certificates be classified according to the classification of mines, and that such classification be made general in the coal-producing states.

In Alabama, we have two classes of certificates; the first applying to mines generating explosive gas and the second to nongaseous mines, which fact implies a similar classification of the mines in this state. It would be manifestly unwise to make a holder of a second-class, Alabama certificate eligible to a similar position in another state, without regard to the gaseous character of the mine, although he would be fully competent to handle a nongaseous mine in any state. Again, the manner of handling gases under various conditions is so similar in all coal mines, that the holder of a first-class Alabama certificate should be qualified to hold a similar position in any state or country. In like manner, the qualifications of a fireboss are practically identical everywhere.

It appears to me that sufficient importance has not been attached, in this discussion, to the part every employer takes in the selection of a mine foreman or fireboss. No employer will risk his property and the safety of his employees by giving a man charge in a mine, before he has fully satisfied himself of that man's knowledge and fitness for the position he is to occupy. He will inquire to ascertain whether his experience has been such as to make him familiar with the conditions he is to handle.

It should be borne in mind that the holding of a certificate of competency is not the supreme qualification of a successful foreman or fireboss. The ability of a foreman to handle men, plan work, think correctly and act quickly in an emergency, as well as his judgment, alertness, industry, soberness, devotion to duty and loyalty to his employer are even of greater importance than the certificate he holds. A man may possess a first-class certificate with a high grade and yet be deficient in many of these essentials. The point I desire to urge is that a man who holds a certificate of qualification, granted in one state, and who is able to satisfy a would-be employer in another state, as to his ability to fill the position successfully, should not be barred by law from taking that position until he has passed a similar examination in the state in question. Such requirement works a hardship on the man and handicaps the employer in his attempt to secure an efficient foreman or fireboss.

It is a fact that many a competent man hesitates to give up a position in one state, upon the offer of a higher position in another state, because of the risk he takes in being able to pass the required examination. Attention has been drawn frequently to the fact that many of the best and most successful mine managers and foremen had little or no early education; but by diligent study and application, they have risen to a position of responsibility. Such men are ill equipped to solve offhand many of the purely theoretical problems required in an examination; and many of these problems rarely confront the mine foreman, in actual practice.

It should be remembered that the most practical mine foremen and firebosses today are studying the actual problems involved in their work. Their spare time is largely devoted to the reading of mining journals and other literature that will keep them fairly well informed on occurrences and abreast with the times in respect to mining practice. It is rare that much of this time is spent in brushing up their mathematics. Again, the excitement and uneasiness that usually take possession of a man in an examination on which much depends, prevents him from doing his best work. Under these conditions, he will often make mistakes that he would not make under other conditions.

I have in mind a successful mine official whose greatest misfortune was that his early education was deficient; but, by means of a correspondence course and hard study, he obtained a sufficient knowledge of mathematics to enable him to pass an examination with a high percentage mark. He has been since that time preëminently successful and is considered by all who know him best, including his present employers, as the best all-around mining man in the state. However, in the absorption of his duties, he has forgotten what mathematics he knew, and today would be unable to pass an examination, as he could not solve a simple triangle, without reference to his handbook. The fear of failing to obtain a certificate in another state has kept this man from accepting positions at higher salaries outside of his own state.

In most cases, it is idle to say that if a man is truly ambitious, he will study sufficiently to pass the examination required for the position he desires. Most men will refuse to "cram" today for an examination, and to study to remember things that they will not use again and forget tomorrow. We must take men as they are and not as we think they ought to be. I may add that

the limitation of a practical man's employment to a single state is not his loss alone, but one that affects the mining industry in all states. A classified universal certificate, or interchange of certificates between states, would benefit all concerned.

WM. KELLUM, Sup't.,
Southern Coal & Coke Co.

Glen Carbon, Ala.

The McAllister Experience

In reading the discussion on Retarding Ventilation when Firing, COAL AGE, Jan. 17, p. 122, I was surprised and disappointed to find that Mr. Paul should speak so disparagingly of the narrated experiences of Mr. McAllister, who conducted a series of experiments in a Kansas mine a few years ago. The experiments were fully described in a number of letters in COAL AGE, a year ago; but the letter to which Mr. Paul particularly refers, COAL AGE, Vol. 3, p. 25, describes a remarkable experience in the rescue of men after an explosion.

To throw doubt on *all* of Mr. McAllister's experiences and statements, because he said that he found "a small tunnel of air traveling in the center of the entry," is, to say the least, in my opinion, ill-advised and unwarranted. We may reject Mr. McAllister's conclusions, but nothing

is gained by disregarding facts that are evidently true. Also, we are compelled to admit that this man has rendered valuable service in his investigations of the phenomena of mine explosions. In my opinion, he has shown himself to be a courageous, observing, practical miner, who has repeatedly risked his life in attempts to ascertain the true facts. Because he may have failed, in a scientific sense, to express correctly his meaning is no excuse for discrediting his statements.

After any mine explosion, there is bound to be a reflex movement of the air in order to bring about an equalization of temperature throughout the entry. As Mr. McAllister entered the mine immediately after the explosion, this reflex movement of air, which was especially marked along the bottom or floor in the center of the entry and which I have often myself experienced, was probably more pronounced under the conditions existing in that mine, than anything observed by Mr. Paul. In his description, Mr. McAllister does not state that the air traveling in the center of the entry was "pure," as Mr. Paul quotes him; but, in his rescue of the men, he proved that this air would sustain life and permit strenuous bodily exertion at the same time.

JOHN VERNER,
Ex-Mine Inspector.

Chariton, Iowa.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Example—To show the effect of natural air columns in fan ventilation, assume a shaft mine ventilated by means of a fan; the seam is practically level; the fan shaft is 800 ft. deep and the hoisting shaft 600 ft. deep.

(a) Assume the fan is exhausting and produces a circulation of 200,000 cu. ft. of air against a water gage of 2 in. in the winter when the outside temperature is 30 deg. and that of the mine 60 deg. F., and calculate the resulting water gage and the volume of air that the fan will circulate, running at the same speed in the summer season when the outside temperature is 70 deg. and that of the mine, as before, 60 deg. F.

(b) Assume the same conditions in the mine and the same respective temperatures and calculate the water gage and volume of air this fan will produce when running at the same speed and blowing instead of exhausting the air, for the winter and summer seasons, respectively.

Solution—(a) When the fan is exhausting, the fan shaft being the upcast, the effective depth of air column is $D = 800$ ft. The natural water gage due to this depth (barom., B. = 30 in.) is

$$\text{Winter, } w.g. = \frac{1.3273 \times 30 (60 - 30) 800}{(460 + 60) (460 + 30) 5.2} = 0.72 \text{ in. (positive)}$$

$$\text{Summer, } w.g. = \frac{1.3273 \times 30 (70 - 60) 800}{(460 + 70) (460 + 60) 5.2} = 0.22 \text{ in. (negative)}$$

In the circulation of 200,000 cu. ft. of air, under a 2-in. water gage, as stated in the question, therefore, the water gage due to the action of the fan is $2 - 0.72 = 1.28$ in., the natural water gage, in this case, assisting circulation, being positive. In the summer season, the fan exhausting at the same speed as before will create the same ventilating pressure and water gage (1.28 in.); but, the natural air column now being negative (0.22 in.), the effective water gage producing circulation is $1.28 - 0.22 = 1.06$ in. Then, since the circulation in any given mine or airway varies as the square root of the pressure or water gage, the quantity ratio is equal to the square root of the water-gage ratio.

$$\frac{x}{200,000} = \sqrt{\frac{1.06}{2}} = \sqrt{0.53} = 0.728$$

Summer (exhausting), $x = 200,000 \times 0.728 = 145,600$ cu. ft. per min.

(b) When the fan is blowing the hoisting shaft is the upcast and the effective depth of air column is then $D = 600$ ft. The natural water gage is then $600/800 = \frac{3}{4}$ of the value previously found; or $\frac{3}{4} \times 0.72 = 0.54$ in. (winter), and $\frac{3}{4} \times 0.22 = 0.165$ in. (summer). As before, the natural gage is positive in winter and negative in summer, which makes the effective gage $1.28 + 0.54 = 1.82$ in. (winter) and $1.28 - 0.165 = 1.115$ in. (summer). The circulation is then

$$\text{Winter (blowing), } x = 200,000 \sqrt{\frac{1.82}{2}} = \text{say } 190,800 \text{ cu. ft. per min.}$$

$$\text{Summer (blowing), } x = 200,000 \sqrt{\frac{1.115}{2}} = \text{say } 149,400 \text{ cu. ft. per min.}$$

The Coal Age Pocket Book

EXAMPLES FOR PRACTICE

1. How many feet of air column is equivalent to a mine water gage of three inches?

Solution—Under ordinary or normal conditions water weighs 815 times as heavy as the same volume of air; hence,

$$\begin{aligned} 1 \text{ ft. (12 in.) water column} &= 815 \text{ ft. air column} \\ 1 \text{ in. water gage} &= 815 \div 12 = 68 \text{ ft. air column} \\ 3 \text{ in. water gage} &= 3 \times 68 = 204 \text{ ft. air column} \end{aligned}$$

2. Express the pressure equivalent to 200 ft. of ordinary air column, in pounds per square ft.; ounces per square inch; inches of barometer; inches of water gage.

Solution—

$$\begin{aligned} 200 \div 13 &= 15.39 \text{ lb. per sq. ft., nearly} \\ 200 \div 117 &= 1.71 \text{ oz. per sq. in., nearly} \\ 200 \div 920 &= 0.22 \text{ in. of mercury, nearly} \\ 200 \div 68 &= 2.94 \text{ in. of water gage} \end{aligned}$$

3. What is the pressure of the atmosphere, in pounds per square inch, corresponding to a barometric pressure of 30 in.?

Solution—

$$\begin{aligned} 30 \times 7.86 &= 235.8 \text{ oz. per sq. in.} \\ 235.8 \div 16 &= 14.74 \text{ lb. per sq. in., nearly} \end{aligned}$$

4. Find the pressure in ounces per square inch corresponding to a water gage of 2.5 in.

Solution—

$$2.5 \times 0.58 = 1.45 \text{ oz. per sq. in.}$$

5. Find the barometric pressure in inches of mercury corresponding to a water gage of 3.4 in.

Solution—

$$3.4 \div 13.6 = 0.25 \text{ in.}$$

6. If an aneroid barometer gives a reading of 29.65 in. on the surface, what should be the reading at the bottom of a downcast shaft 500 ft. deep where the ventilating pressure caused by a blowing fan gives a water gage of 2.85 in., assuming all readings are taken at about the same time?

Solution—The air column in this shaft will increase the barometric pressure $500 \div 920 = 0.54$ in. The water gage due to the blower will still further increase the barometric pressure, at the foot of the downcast shaft, $2.85 \div 13.6 = 0.21$ in. The reading of the aneroid, therefore, should be $29.65 + 0.54 + 0.21 = 30.4$ in.

7. In a mine ventilated by an exhaust fan, giving a water gage of 2.33 in., if aneroid readings taken on the surface and at the bottom of the upcast shaft show a difference of 0.76 in., what is the calculated depth of the shaft?

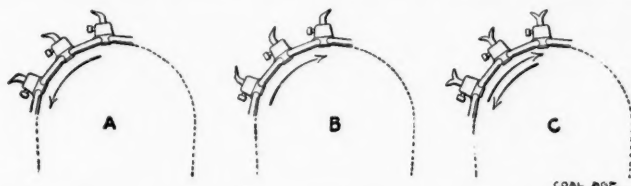
Solution—The action of the exhaust fan makes the aneroid reading at the shaft bottom lower than it would be if the fan were not running, and decreases the difference of the surface and underground readings $2.33 \div 13.6 = 0.17$ in. of mercury. The difference of reading due to the depth of the shaft only is, therefore, $0.76 + 0.17 = 0.94$ in. of mercury. Reducing this barometric difference to air column gives for the approximate depth of the shaft $920 \times 0.94 = \text{say } 865$ ft. under ordinary conditions.

Inquiries of General Interest

Reversible Coal-Cutting Machine

I would like to draw attention to the reversible feature of the Sullivan "Ironclad" CE-7, shortwall machine. Those familiar with this machine know that it operates on the same principle as previous types of Sullivan continuous-cutting machines, for use in room-and-pillar work. The machine is sumped under the coal at one rib and undercuts the entire face of the room to the other rib where it is backed out and loaded for transportation to the next working place.

The new feature to which I refer, in the ironclad model, is its reversibility, which enables the machine to cut from right to left or from left to right. To do this, however, it is necessary to change the bits from the position shown in the sketch at A, to the position shown at B. The arrows show the direction in which the cutting



A SUGGESTION OF A DOUBLE-TOOTH BIT IN A REVERSIBLE COAL-CUTTING MACHINE

chain revolves, the first (A) cutting from right to left and the second (B) cutting from left to right. Of course, after changing the bits, the motor must also be reversed.

I want to make a suggestion, which, if possible or practicable, would greatly expedite the work, by enabling the machine to cut, either right to left or left to right, without the necessity of changing the bits. The suggestion is to use a double-toothed bit, as shown in the figure at C.

The scheme, if practicable, would possess another advantage, as it would then be possible, if a tooth was broken or dulled badly, to reverse it by loosening the set-screw and turning it over. I would like to have the views of readers of COAL AGE who are familiar with this machine, in reference to this suggestion.

A READER.

Oliphant Furnace, Penn.

Longwall Mining

I am much interested in the matter of longwall mining on the retreating plan, and would like to ask two questions:

1. Can any of the readers of COAL AGE suggest a method of timbering or cribbing and the general arrangement of a longwall face over 300 ft. in length, when working a seam of semibituminous coal averaging 3½ ft. in thickness, under 300 ft. of cover. The roof is a hard

slate, varying from 1 to 12 ft. in thickness; and overlying the slate is sandrock or a sandy shale, from 10 to 20 ft. thick. There are slips in the slate running almost at right angles to the face of the coal. What I most desire to know is the best method of arranging the timbering or cribbing to secure the proper breaking of the roof.

2. Is there a method of longwall retreating being worked successfully in either the Pittsburgh or Central Pennsylvania district; and, if so, where? I shall much appreciate any suggestions from readers who have had experience in this system of mining.

BITUMINOUS.

Windber, Penn.

One of the most essential features in successful coal mining is a roof that will bend without breaking. The breaking of the roof over a longwall face almost invariably results in disaster. Success in the operation depends on maintaining a constant, traveling weight that advances with the progress of the work, only enough pressure being thrown on the face to break down the coal when it is undermined.

Cribs are only used in special cases of longwall mining. The more common method is to employ two and sometimes three rows of posts parallel to the face of the coal. These posts are set on a slight mound of dirt or slack that will enable them to take the pressure gradually without breaking and that will make it possible to draw them more easily, at the proper time. As the working face advances, a new row of posts is set in front and the posts at the rear are then drawn, so as to allow the roof to settle uniformly on the packs or waste.

In this connection, we would refer to the article by Samuel Dean, on Retreating Longwall Mining Methods, COAL AGE, Vol. 4, p. 722; and the two interesting letters discussing this method, by Charles Wayne and William James, Jan. 10, p. 99. We shall be glad to hear from readers in answer to the second question and to have further suggestions on this important subject.

Ventilation

Kindly answer the following question in COAL AGE: What is the theoretical velocity of air corresponding to a 1-in. water gage? I am unable to recall the formula required for this calculation.

FORGOTTEN.

Welch, W. Va.

The formula for finding the theoretical velocity of any fluid, air or water is $v = 8\sqrt{h}$.

Now, since 1 in. of water gage is equivalent to 68 ft. of air column, under normal conditions (COAL AGE, Dec. 27, 1913, p. 990), we have, for the theoretical velocity of air (ft. per sec.), expressed in terms of water gage (in.),

$$v = 8\sqrt{68 \text{ w.g.}} = 66\sqrt{\text{w.g.}}$$

Therefore, for a 1-in. water gage, the theoretical velocity of air is $66\sqrt{1} = 66$ ft. per sec.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—What method would you use in extracting pillars, using mining machines for this purpose, under ordinary conditions of roof and floor?

Ans.—Assuming a level seam and the conditions of roof and floor such as to enable mining machines to be used with safety in the extraction of pillars, two general systems are in use. Under suitable conditions of roof and floor, permitting the extraction of a considerable percentage of the coal in the first working, the rooms are often driven the usual width, say 20 or 24 ft., with pillars varying from 10 to 16 ft. wide, between them.

In that case, when the rooms have reached the limit the pillar is cut across at the end, by the machine, the cut being about 7 or 8 yd. wide. This being done, a stump is left that varies from 5 to 8 ft. wide, depending on roof and other conditions, and another cut, 7 or 8 yd. wide, is made across the pillar with the machine, as before. The coal is loaded out as each several cut is made, until the pillar is cut across. When this is done, the 5- or 8-ft. stump is removed with a pick and the roof allowed to fall. The same process is continued until the entire pillar is removed up to the entry stump.

Another method is adapted to roof conditions that are not as favorable to wide openings. In this case, the rooms are driven up as stalls 4 or 5 yd. wide, with pillars varying from 10 to 20 yd. in width, between them. Where the conditions will permit, wider pillars (100 yd.) are left and a face track is then laid along the face, the pillar having first been crosscut at its inby end. It is now worked out on the retreating plan.

In this method, two or three rows of posts are set parallel to the face of the pillar and at such a distance back as to permit the machine to be worked freely between the coal face and the first row of props. A cut is made with the machine across the entire face of the pillar. This coal is loaded out in the usual manner and a new row of posts set, after the track has been shifted forward a distance equal to the depth of the cut. The back row of posts is then drawn, after which another cut is made with the machine, as before. This process is continued until the entire pillar is removed, up to the entry stumps.

Ques.—(a) What percentage of fuel will be saved by heating the feed water of a boiler to 150 deg. F., by means of the exhaust steam, before introducing the water into the boiler, instead of feeding the water to the boiler at a temperature of 50 deg. F. Assume the total heat of vaporization or the heat above 32 deg. F., for a boiler pressure of 100 lb. per sq.in., as 1185 B.t.u. (b) Assuming that this percentage of fuel is saved, at a mine using 1200 lb. of coal per hr., what weight of coal will be saved in a day of 8 hr.?

Ans.—(a) The weight of coal burned being proportional to the heat (B.t.u.) developed, the percentage of fuel saved is the same as the percentage of B.t.u. saved in the

heating of the feed water from 50 deg. to 150 deg. F. The heat thus saved is $150 - 50 = 100$ B.t.u., per lb. of water evaporated, or steam generated. At a boiler pressure of 100 lb. per sq.in., the heat in the steam above 32 deg. F. being 1185 B.t.u., the heat above 50 deg. F. is $1185 + 32 - 50 = 1167$ B.t.u. The percentage of heat saved is, therefore, $100 \times 100 \div 1167 = 8.57$ per cent. As previously stated, this is the percentage also of fuel saved by heating the feed water from 50 deg. to 150 deg. F., by means of the exhaust steam.

(b) The saving of fuel at a mine burning 1200 lb. of coal per day is, therefore, $0.0857 (8 \times 1200) = 832 + \text{lb.}$

Ques.—What would be the height of motive column in a mine where the depth of both the upcast and downcast shaft is 300 ft., the temperature of the downcast shaft being 32 deg., and that of the upcast, 48 deg. F.?

Ans.—Assuming a level surface, or what is the same, a level seam, the motive column, in this case, depends on two temperatures only; namely, those of the upcast and downcast shafts, respectively. The motive column may be calculated in terms of the downcast air, as follows:

$$M_d = \frac{(T - t) D}{460 + T} = \frac{(48 - 32) 300}{460 + 48} = \frac{4800}{508} = 9.45 \text{ ft.}$$

In terms of the upcast air, this air being lighter than that of the downcast, the column will be longer. The calculation is as follows:

$$M_u = \frac{(T - t) D}{460 + t} = \frac{(48 - 32) 300}{460 + 32} = \frac{4800}{492} = 9.75 \text{ ft.}$$

Ques.—What pressure will be necessary to pass 20,000 cu.ft. of air per min. through an airway 6x14 ft. and 3000 ft. long? Assuming there is no change in the temperature of the air current and ignoring any change in volume due to a decrease of ventilating pressure, if the volume of the return air is found to be 20,300 cu.ft., what percentage of gas is contained in this current; and, assuming that the gas present is all marsh gas, what indication would be shown on the flame of the safety lamp in the return current?

Ans.—Under the assumed conditions, the increase in volume, which is $20,300 - 20,000 = 300$ cu.ft. per min., represents the volume of gas in the return current. The percentage of gas present is then $\frac{300 \times 100}{20,300} = 1.47$ per cent. It would not be possible to detect this percentage of gas on the flame of an ordinary Davy lamp.

✂

CORRECTIONS

(Examination Question, Dec. 13, 1913, p. 914)

Ques.—If 20,000 cu.ft. of air and gas, etc.

Ans.—The answer should read as follows:

$$24,600 + 1892 - 20,000 = 6492 \text{ cu.ft. per min.}$$

(Examination Question, Jan. 10, p. 103)

Ques.—We have a tank full of water, etc.

Ans.—The answer should read as follows:

$$2394 \div 672 = 3.56 \text{ hours, say 3 hours 30 min.}$$

Coal and Coke News

Washington, D. C.

There seems every reason to expect an elaborate inquiry will be made into both the Colorado and Michigan mining strikes by the House Committee on Mines. It is believed that the hearings on the subject will begin within a couple of weeks and that an effort will be made to thresh out all of the facts in both situations just as was done with reference to the West Virginia mine strike situation.

Sharp criticism of this plan is being offered by a number of congressmen who are of the opinion that the controversies in question do not involve any subject over which the United States Government has jurisdiction. Insofar as the Government has anything to do in the matter, it is claimed by them, the subject is one for investigation by the Department of Labor which is under the law specifically vested with powers of mediation and conciliation whenever it can induce employers to accept its offices in that capacity.

Some time ago an attempt was made to induce the new industrial relations commission to look into both of these strikes and it was semi-officially announced that the commission had been brought to the point of accepting this work as one of its duties.

Later on the decision was reached not to take up the investigation of contemporary labor controversies, and while the rule thus established was broken in the case of the New York garment-workers strike, this apparently was only a temporary lapse from the position then taken, inasmuch as it has now been practically resolved by the mines committee to take up this work, thus indicating that the effort to shoulder it off upon the industrial commission was not successful.

HARRISBURG, PENN.

The constitutionality of the 1913 act providing for a tax on anthracite coal was attacked in the Dauphin County Courts on Jan. 22, when a suit in equity was filed by the People's Coal Co., of Scranton. Frederic W. Gleitz, counsel for the company and an ex-Attorney General, filed the proceedings, which are directed against Auditor General Powell and State Treasurer Young, fiscal officers of the state. The Attorney General's department accepted service.

The act signed June 27, last, provides for a 2½ per cent. tax on coal mined, and the money thus raised is to be divided equally between the state and the municipalities of the county where the coal is mined.

It is set forth by the papers filed that the constitution is violated because the tax is confiscatory, and that the coal companies would not be doing their duty to their stockholders or the public if the act were not tested. An injunction asking that the Auditor General and State Treasurer be restrained from assessing, collecting or distributing the tax is sought.

The People's Coal Co. asserts that the tax it must pay will amount to \$15,000 annually and that the total tax will reach in the state over \$7,000,000.

The chief contention will be that the measure is class legislation and that it is in conflict with the 14th amendment of the constitution of the United States, and is also in violation of the constitution of the state.

If the tax is to be laid, then, all coal should be included and not only anthracite. It is also contended that the bill in effect is not a revenue-producing act, but levies a personal tax. The method of distributing the tax is also unconstitutional, it is contended, upon the ground that the money would be distributed among municipalities by means of special appropriations.

A great many people believe the strongest point against the law is its alleged conflict with the clause of the United States constitution forbidding any state to levy export duties, that being the exclusive privilege of congress. A considerable quantity of anthracite is exported to Canada, and it is said it would be impossible to differentiate on the product mined for that country and that intended only for home consumption. The test of the validity of the law will be carried to the United States Courts as well as those of Pennsylvania.

Filing of the action in equity will not halt the steps taken by the Auditor General for the collection of the tax, because the bill entered in the case does not ask for an injunction,

except after the hearing. Operators have until the end of January to file their sworn statements of production during 1913, and then bills will be sent out from the capitol.

Attorney-General Bell will determine during the week the manner of meeting the suit, whether a demurrer or an answer should be filed. It is probable that the suit will be argued in Harrisburg before the Dauphin County Court within a few months, and that other coal companies will enter into the proceedings in order to test questions that have arisen.

PENNSYLVANIA

Anthracite

Scranton—The legal suit against the Peoples Coal Co. by the Lackawanna Coal Co. begun as an injunction proceeding to restrain the former firm from mining coal out of its bounds in West Scranton has been terminated by the Peoples Coal Co. purchasing the land in dispute.

Hazleton—The building of five new mess houses at as many collieries has been authorized by the officials of the Lehigh Valley Coal Co. These structures will be of a standard design based on that of the mess house built experimentally at the Prospect Colliery of this company. The size will, however, depend upon the number of men working at the various operations. Their construction will be started at once.

Wilkes-Barre—Judge Garman, of Luzerne County recently granted a compulsory non suit in the case of Cornelius Vistock against the Pennsylvania Coal Co. Holding that the mine foreman and not the coal company or mine superintendent was responsible for the safety of mine passages after they were opened. The Supreme Court in a somewhat similar decision holds that neither a superintendent nor the owners of the colliery are at liberty to disobey the mine foreman's instructions as to how business inside the mine shall be conducted and managed.

Plymouth—The grievances of the miners employed at the No. 11 Colliery of the Lehigh & Wilkes-Barre Coal Co. regarding the reinstatement of check docking boss Joseph Bogdan has been decided in favor of the miners, and the checking boss is back at work. The contentions of the officials was that the presence of Bogdan at the colliery created trouble and finally resulted in a strike. The difficulty was brought to a temporary settlement by the appointment of District Vice-President Joseph Yanis as check docking boss.

Bituminous

Johnstown—Extensive changes are expected to be made shortly in the Kennerly coal holdings in this vicinity. Philadelphia banking houses are said to be interested both in the property of the Valley Smokeless Coal Co. and the Seward operations of Mr. Kennerly. It is said that one firm is interested to the extent of \$100,000 and another for about \$250,000 which indicates that the bankers now control the property.

Furnace Run—The general repair shops of the Allegheny River Mining Co. at this place were recently placed in operation. Repair work for all of the mines of the above mentioned company in Jefferson and Armstrong counties will be done at these shops.

Rockwood—Hitchman Bros. are making preparations for the opening of their big coal tract about 4 miles west of Rockwood, comprising approximately 5000 acres of coal. It is said that two openings will be operated and that construction work will be begun in the near future.

Du Bois—The strike which has been in progress for some time at the Eriton shaft has been ended, a satisfactory understanding, which is to be in force until the present wage-scale agreement expires, having been arrived at.

Washington—The entire town of Desco, together with a modern coal and coke plant recently became the property of I. W. Semans, of Uniontown. This town, which has just been completed, comprises 57 houses, 257 coke ovens, and 300 acres of coal land together with an up-to-date mine.

Wampum—I. E. Ingham & Co. will shortly open a new coal mine at this place. It is expected that about 65 more men will be employed.

WEST VIRGINIA

Charleston—A \$60,000 coal tippie of the Boomer Coal & Coke Co. was completely destroyed by fire recently. It was necessary to use dynamite to blow up this structure in order to save three smaller ones which were in close proximity. The cause of the fire was unknown.

Attorneys E. W. Keatley and C. M. Alderson recently returning from New York where they conferred with the English and American representative of the British syndicate which contemplates the purchase of the entire New River coal fields state that there is every prospect of a consummation of the deal.

Clarksburg—The entire holdings in the Irvington-Late Coal Co. have been purchased by Gordon D. Late, who will continue the operation of the plant under the name of the Gordon D. Late Coal Co.

The organization of the First Aid to the Injured Association, which was to have been effected at Fairmont, Jan. 22, was postponed indefinitely on account of there not being enough of the coal operators present to express their sentiment regarding the matter. Such associations have been formed in a number of states, and many of the coal operators throughout West Virginia are desirous of forming a like organization here.

Fairmont—Fire recently destroyed the tippie of mine No. 21 of the Consolidation Coal Co. at Gypsy. The origin of the conflagration is unknown. The construction of a temporary tippie was at once begun and it was stated that no men would lose time on account of the fire.

TENNESSEE

Chattanooga—The Continental Coal Corporation has sold approximately 3000 acres of its undeveloped lands in Bell County, Kentucky, for about \$550,000. This transaction means a reduction of something like \$700,000 in the company's bonded indebtedness and about \$100,000 in its floating loans.

KENTUCKY

Madisonville—Rumors continue to circulate in the western Kentucky district, to the effect that deals are pending for the transfer of coal rights in that section, in addition to those already reported as consummated. Options are said to have been given on large properties to the same interests which have made the purchases heretofore noted. These reports, however, continue to limit themselves to undeveloped property, and no options or sales have yet been suggested relating to existing operations.

Pineville—Reports are to the effect that contracts have been let for the camp construction and development work on four large coal operations in the Harlan county field, which, when finished, will add about 2000 tons a day to the production of the field. This is already estimated to be about 6000 tons a day. Other developments are projected in that field, following various deals which have been reported within the past few months.

OHIO

Columbus—A joint committee of operators and miners will assist the newly created safety commissioner John M. Roan to prepare regulations to reduce the hazard in mines. A meeting of mine bosses and superintendents of the Hocking Valley field, held at Athens, has promised to give the movement enthusiastic support. The plan is to have all regulations promoting safety passed upon by both miners and operators, so that there will be no friction in introducing reforms.

Bellaire—The property of the Gordon Coal Co., of Stewartsville has been leased to J. F. Johnson, of this city, who has also secured a 14-months' option on the property which consists of one coal mine and all the necessary equipment. It is expected that the output of this mine will be approximately doubled in the near future and the number of men employed greatly increased.

INDIANA

Terre Haute—Nine miners were injured, Jan. 27, one probably fatally, when the engineer at Mine No. 1 of the New Central Coal Co. lost control of his engine, causing the cage carrying the men to run wild to the bottom of the pit, a distance of 200 ft., where all were hurled out. The injured men were brought to this city.

Indianapolis—The convention of Michigan, Ohio and Indiana Coal Dealers will be held in this city this year, the directors having accepted an invitation extended by the Indianapolis Retail Coal Merchants Credit Association. It is expected the date will be about June 15. H. H. Deam, Bluffton, Ind., is president of the association and B. F. Nigh, Columbus, Ohio, is secretary.

ILLINOIS

Duquoin—Abe Eaton, manager of the Majestic mine, has been acquitted at Mt. Vernon on the charge of murdering Wm. Sisney, president of the miners' union here. The case was taken to Mt. Vernon on change of venue. The trouble arose over an argument several months ago.

Danville—An idea as to what business conditions in Illinois have been during the year 1913, may be gained from the fact that the Federal Court of the Eastern District of Illinois, shows that there were 177 bankruptcies in the southern part of Illinois during the year. The number in 1912 was 110. For years previous to 1912 the number was far below 100. Included in the number for 1912 and 1913 were several big coal companies.

Pana—Owing to the mild weather and slight demand for coal nearly a score of the largest coal mines in the central Illinois district have recently suspended operations. These suspensions have thrown more than 3000 men out of employment.

Chicago—The Chicago, Rock Island & Pacific R.R. Co. has stored about 500,000 tons of coal at Des Moines and West Liberty, Iowa. This has been done on account of the threatened general strike of the miners in the Middle West on Apr. 1.

KANSAS

Topeka—Based on the number of men used in the mines 30% more coal was produced at the State Penitentiary during 1913 than in 1912. Five months' daily reports show 33,323 working days in the mines in 1912 as compared with 27,858 working days in the same period of 1913. Last year the men from the mines were worked in the construction of the prison twine plant and buildings destroyed by the fire in April. At the present time only about 175 men are used in the mines as compared with 250 a year ago.

SOUTH DAKOTA

Woonsocket—Excitement has been caused here by the discovery of a bed of lignite coal on the farm of Joseph Dodd.

WYOMING

Cumberland—A diamond drill operated by representatives of the Union Pacific Coal Co. has located a vein of coal 18 ft. thick, seven miles south of Cumberland in Uinta County.

RECENT COAL AND COKE PATENTS

Coke Oven. W. M. Person, Sparrows Point, Md. 1,079,062, Nov. 18, 1913. Filed Aug. 31, 1910. Serial No. 579,897.

Fire Box Construction. J. M. McClellon, Everett, Mass. 1,078,933, Nov. 18, 1913. Filed Dec. 26, 1911. Serial No. 667,841.

Smoke Consuming Mechanism. D. D. Keltner, Des Moines, Iowa. 1,078,927, Nov. 18, 1913. Filed Oct. 14, 1912. Serial No. 725,561.

Mine Car Lubricator. J. H. Thomas, Independence, Col. 1,080,500 Dec. 2, 1913. Filed May 29, 1912. Serial No. 770,716.

Gas Producer. C. M. Garland, Assignor to Camden Iron Works, Camden, N. J. 1,079,234, Nov. 18, 1913. Filed Jan. 6, 1913. Serial No. 740,469.

Self Acting Conveyor for Coal and Coal-Packing in Colliery Inclines of Low Gradient. L. Hyve, Dorignies, France. 1,079,176, Nov. 18, 1913. Filed Oct. 15, 1912. Serial No. 725,851.

PERSONALS

E. T. Hendon, receiver for the Oak Leaf Coal Co., a bankrupt concern of Cordova, Alabama, was recently elected trustee without opposition at a meeting of the creditors.

J. J. Malloy for the past 7 years a mine foreman at Davidson, Penn., has been appointed superintendent of the Filbert plant of the H. C. Frick Coke Co. He will assume his new duties on Feb. 1.

H. H. Robertson, president of the Asbestos Protected Metal Co. of Beaver Falls, Penn., has been elected vice-president of the Pittsburgh Branch of the National Council for Industrial Safety.

L. O. Mellinger, superintendent of the Furnace Run operations of the Allegheny River Mining Co., has resigned to accept service with the Rochester & Pittsburgh Coal & Iron Co. He will be succeeded Feb. 1 by Samuel Wallwork.

L. C. Sherrill, prominently identified for the past few years with the Pioneer Coal & Coke Co., of St. Louis, has resigned that company to accept the sales management of the fuel department of the Roman & Bush Pig Iron & Coke Co.

Ralph Lockhard formerly superintendent of the Quemahoning Coal Co.'s mines at Ralphton, Penn., has been elected manager of the Canadian Collieries, Ltd., which has developments under way in the vicinity of Cumberland, B. C.

Thomas Davis, of Nanticoke, has been elected a member of the executive board of the United Mine Workers of America by the members of the union in that district, to fill the vacancy caused by the death of John Fallon, of Wilkes-Barre.

Heber Denman has been appointed asst. general manager under Thos. Fisher, of the Berwind-White Coal Mining Co. at Windber, Penn. This company recently abolished the office of general superintendent formerly held by Walter R. Calverley.

At the recent annual meeting of the St. Louis & O'Fallon Coal Co., T. M. Jenkins, former general manager of the St. Louis & Suburban Ry., was elected president; Adolphus Busch, Third, vice-president; Geo. Kauffman, secretary and treasurer.

William A. Rodda, of the United Mine Workers of America, was held up on the night of Jan. 19, by two men on the limited train of the Baltimore & Ohio R.R. and robbed of the membership rolls of the newly organized lodge of the United Mine Workers in Frostburg, Md.

Daniel F. Connor, general sales agent of Whitney & Kemmerer, returned recently from a trip looking over the conditions throughout the territory. He was very optimistic over the outlook of the industry and was gratified at the progress which has been made during the winter. He expects to sail for Panama, Feb. 7.

A. Reiche formerly general manager of the Orenstein-Arthur Koppel Co. at Koppel, Penn., has severed his connection with the firm to assume the position as managing director of a German concern manufacturing locomobiles and agricultural machinery. He will be succeeded by Mr. Erich Joseph formerly of New York.

Edgar Wallace, editor of the United Mine Workers Journal, has given bond in the Federal Court in Indianapolis for his appearance in Colorado to answer an indictment of officials of the union charging them with violation of the Sherman anti-trust law in restraining trade in coal and boycotting mines not employing union labor. Other officials were also indicted.

John R. Bryden, for many years the general manager of the Scranton Coal Co. and the Elk Hill Coal Co., has tendered his resignation, and has been succeeded by William L. Allen, formerly general superintendent of the two companies. In addition to having been the general manager, Mr. Bryden was a member of the board of directors, and also vice-president. It is not known whether or not he is to retire from these positions as well.

OBITUARY

D. D. Shumway, vice-president and treasurer of the Springfield Coal Mining Co., a prominent coal man of the state of Illinois, suffered a stroke of apoplexy at 5 o'clock, Jan. 20, and died at St. Johns' Hospital a few hours later. The coal company of which Mr. Shumway was an officer, recently suspended operations at all of its mines for an indefinite period and it is thought that the failure of the company to show a profit is partly responsible for the death of the vice-president and treasurer. Mr. Shumway is survived by his widow, three sons, one brother and two sisters.

CONSTRUCTION NEWS

Furnace Run, Penn.—An additional 500-kw. Westinghouse turbo generator is being installed by the Allegheny River Mining Co. at this place.

Hartford, Ark.—The Central Coal & Coke Co. announces that it will shortly spend between \$150,000 and \$200,000 in opening a new coal mine near this place.

Salem, Ohio—The Dunn Coal Co., of this city, which has under lease a large area of coal north and east of Beloit, is preparing to open mines early in the spring.

Superior, Wis.—The mammoth coal dock of the Berwind Fuel Co. will be completed this year. It is also contemplated to build a briquette plant during the coming season.

Somerset, Penn.—The Consolidation Coal Co. is rushing work on its openings on the John Biesecker farm in the Jenner field. A number of new mines will shortly be opened.

Kittanning, Penn.—A 750-kw. alternating current generator direct connected to a Ridgway engine is being installed at the Conifer operations of the Allegheny River Mining Co.

Columbus, Ohio—An order for 1000 coal cars has been placed by the Kanawha & Michigan Ry. with a Columbus car manufacturing company. The Hocking Valley Ry. has also contracted for 1000 cars with an eastern concern.

Louisville, Ky.—The Harlan Coal Mining Co. has awarded a contract to the Roberts & Schafer Co. for a new "Marcus" coal tippie and retarding conveyor. This plant will be built at Coxton, Ky. at an approximate cost of \$25,000.

Tacoma, Va.—The Greenough Mining Co. will increase its plant by opening five new mines in close proximity, largely increasing the output. The company a few days ago increased its capital stock from \$50,000 to \$1,000,000.

Jenkins, Ky.—The Consolidation Coal Co. makes the announcement that it will open a number of new mines, starting work about Feb. 1. This will greatly increase the coal tonnage from the works in the Kentucky coal field.

Charleston, W. Va.—The Roberts & Schafer Co. of Chicago has secured a contract from the Paint Creek Collieries Co. for the building of a new mining plant in which the "Marcus" table screen will be installed. This tippie will be built at Olcott, W. Va., at an approximate cost of \$27,000.

Viper, Ky.—The Lexington & Eastern Railroad Co. is completing plans for the construction of an 8-mile branch up Mace's Creek from Viper to reach rich coal and timber land holdings of a number of corporations, one of them the Kentucky River Harwood Co. having a number of large mills.

Pound, Va.—The Indian Creek & Pound River R.R. will start immediately the construction of the Upper Pound River branch of the road to reach extensive coal and timber fields soon to be developed by the Guest River Coal Co. and the Tidewater Lumber Co. The development will total several hundred thousand dollars.

Athol, Ky.—The Louisville & Nashville Railroad Co. building a 20-mile cut-off between Athol and Beattyville Junction in order to reduce curves and heavy grades has begun laying steel on the new line. It is expected, that this work will be completed and in operation within 60 days. The company is spending about \$2,000,000 in the work.

Whitesburg, Ky.—It is announced here by representatives of the Mineral Development Co. that a big development work will be started by this company Mar. 1 at Lower Boone's Fork above here where at least two good-sized industrial cities will be built and a large number of mines opened. Several million dollars will be expended in the development.

Fleming, Ky.—S. T. Mundy who has the contract for the construction of the three-mile branch road up Yount's Fork—a spur of the Lexington & Eastern—has just put 400 extra men on the work in an effort to push its construction. The road will be completed and in operation within 60 days. The Mineral Fuel Co. will spend several million dollars in developments on Yount's Fork.

Waynesburg, Penn.—Rumors are circulating in Greene County to the effect that the Baltimore & Ohio R.R. is planning an east and west line through Greene County, which would open up rich coal territory. It is anticipated that this line would pass through Waynesburg, Rogersville, Rutan and Graysville emerging through the southern section of West Finley Township, Washington County, where but a short line would connect it with the Pittsburgh & Wheeling division of the Baltimore & Ohio.

Whitesburg, Ky.—A number of large coal developments have been recently started in the eastern Kentucky field especially along the Lexington & Eastern R.R. Among these might be mentioned the Wolf Valley Coal & Coke Co., which proposes starting development work in the next few days and having everything in readiness to ship coal by spring. The Garret-Hardwick Coal Co., has also made the necessary arrangements to start immediately the work of development. A modernly equipped mining plant will be built as well as a number of large sawmills. The Williamson & Pond Creek R.R. Co. also contemplates building 17 miles of coal and

lumber road from the head waters of Pond Creek, to a connection with the Chesapeake & Ohio R.R.

Whitesburg, Ky.—The present year will see an unusual amount of railroad building throughout the Big Sandy and Kentucky River valleys, which comprise a large portion of the coal fields of eastern Kentucky. The Kentucky River and Tug Fork R.R. Co. was recently organized to build a line 17 miles long from the head waters of Pond Creek connecting at Shelby Station, with the main line of the Chesapeake & Ohio up to Big Sandy, also the Baltimore & Ohio branch reaching the Consolidation Coal Co.'s extensive operations at Jenkins. A branch line of the Baltimore & Ohio at Long Ford near the Letcher-Pike border, a distance of 8 miles, has also been announced. This is to reach the holdings of the Elkhorn Gas & Coal Mining Co. A large number of branches of the Lexington & Eastern are assured in Letcher and Perry Counties. These include the Pottersfork, Younts Fork and Bottom Branch extensions to reach the holdings of the Mineral Fuel Co. Branches of the Lexington & Eastern are also planned up Big Leatherwood, Line Fork, Mace's Creek and Rockhouse Creek. It is expected that all of these will be built during the present year.

NEW INCORPORATIONS

Linton, Ind.—The Linton-Summit Coal Co. has increased its capital stock from \$45,000 to \$50,000.

Danville, Ill.—The Beach Flats Coal Co. has increased its capital stock from \$100,000 to \$125,000.

Danville, Ill.—The Two Rivers Coal Co. has increased its capital stock from \$100,000 to \$125,000.

Strattanville, Penn.—The Co-operative Coal Co. has been incorporated with an authorized capital of \$50,000.

Cincinnati, Ohio—The Beddall Coal Co., of Union County, has changed its name to the Hercules Coal Co.

Lexington, Ky.—The Eureka Coal & Mineral Co. has been incorporated with a capital stock of \$75,000 to develop coal lands.

Salem, Ohio—The Salem Mining Co. has filed papers with the secretary of state increasing its capital stock from \$75,000 to \$150,000.

Barbourville, Ohio—The Tye-Wheeler Coal Co. has been incorporated with a capital stock of \$10,000. The incorporators are George W. Tye, R. R. Wheeler and Myrtle Tye.

Nashville, Tenn.—The Tennessee River, Coal & Coke Co., of Hamilton County, has been organized with a capital stock of \$125,000. The incorporators are J. P. Gillespie, F. T. Tarver, J. T. Walker, J. E. Pride and G. D. Murray.

Wetumka, Okla.—The Hokesy Mining & Development Co. has been organized with a capital of \$6000. The incorporators are Thos. H. Dunson, Laura E. Dunson and F. H. Williams, all of Wetumka.

Columbus, Ohio—The Bixler-Ohio Coal Co. has been organized in Columbus to mine and deal in coal. The capitalization is \$20,000 and the incorporators are R. T. Irwin, J. W. Miller, A. Roahrig, R. M. Stimmel and D. R. Postlewaite.

Uniontown, Penn.—The Biddle Coal & Coke Co. has been organized in Uniontown to mine coal and manufacture coke. The capital stock is \$250,000, and the incorporators are A. P. Austin, J. P. Robinson, John B. Carr, John E. Hess and George Patterson, all of Uniontown.

INDUSTRIAL NEWS

Cincinnati, Ohio—Fire believed to be of incendiary origin recently totally destroyed the coal elevator of the Baltimore & Ohio Southwestern R.R. in Cincinnati entailing a loss estimated at \$10,000.

Waynesburg, Penn.—George E. Rice, of Waynesburg, recently closed a deal for several small tracts of coal in Belmont County. This purchase gives Judge Steel and his associates title to about 8000 acres of coal on the Baltimore & Ohio R.R.

Charleston, W. Va.—The Safe Deposit & Trust Co., of Pittsburgh, Penn., has purchased from Edward E. Duff, trustee, 14,386 acres of land in Kanawha and Boone Counties, formerly owned by the Forks Coal Co. The price was reported as being \$124,000.

Cairnbrook, Penn.—Noah Blough, owning about 100 acres of coal land above Shade Furnace, closed a deal with H. C. Cook, of Johnstown, for the purchase of the tract for \$25,000. This sale means another opening along the Cairnbrook extension of the South Fork branch.

Fairmont, W. Va.—A report was recently circulated that negotiations were under way which looked to the merging of the Elkhorn Fuel Co. with the Consolidation Coal Co. The properties of these two firms in Kentucky are contiguous and if the deal is effected, it will bring under one management over 400,000 acres of coal in Kentucky.

Philadelphia, Penn.—Figures for the first 11 months of 1913 show that the Reading R.R. shipped more soft coal than hard. Of the total shipments of 27,609,127 tons of coal handled during the first 11 months 15,761,638 tons were bituminous coal and 11,847,489 were anthracite. In other words 57 per cent. of the total coal shipments over the road were of bituminous.

Wheeling, W. Va.—During the past week or so the coal industry in West Virginia has revived considerably, and the mines are now working smoothly and steadily while the demand for coal has increased. The uneasiness over the conference between the miners and operators which will take place in April is thought to be partly responsible for the increased purchasing of coal.

Columbus, Ohio—Requests have been made of Attorney-General Hogan that he drop the suits started by the state against the Columbus & Ohio, Hocking Valley and the Kanawha & Michigan railways to dissolve joint ownership between the three lines. It is said by the officials of the railway companies that the federal decision dissolved the relationship and that this has been lived up to.

New Orleans, La.—The Alabama & New Orleans Transportation Co. recently launched the largest lighter ever built in the South. This craft, which is to be propelled by internal combustion engines has a carrying capacity of 1000 tons, is 240 ft. long and has a rate of coaling vessels of 275 tons per hour. The vessel will be a valuable acquisition to the large fleet of steel barges now owned and operated by the company.

Elkhorn, Ky.—The Elkhorn Fuel Co. which recently purchased a large area of fine coal land from the Long Fork Coal Co. on Long Fork Creek, Pike County, makes the announcement that it will begin immediately the initial work of development there. A first-class coal mining plant will result. The company is well under way on a mammoth coal mining plant on Beaver Creek, building two industrial cities, Wayland and Allen.

Indianapolis, Ind.—Resolutions sent in to the national convention of the United Mine Workers of America from various parts of the central competitive field indicate that it is probable that the scale committee's demands will include one for a 10% advance in wages, and that probably the Ohio miners' demand for "run-of-mine" will be broadened out to include the remainder of the central competitive field. These demands will be laid before the operators at Philadelphia Feb. 3.

Fayetteville, W. Va.—It is rumored in mining circles that the Virginian R.R. will soon award six leases in and around Mullens. It is stated that several applicants for the leases were in the field, but probably two large mining syndicates will be awarded all six. The territory embraced in the field is understood to be 5000 acres, which the road recently acquired in exchange for land situated on Cabin Creek. The whole territory is located on the main line of the Virginian.

Pittsburgh, Penn.—More than 1,000,000 bushels of coal were shipped down the Ohio River, Jan. 22, towed by boats operated by engineers, who, according to the Marine Engineers Association, are strike breakers. The Monongahela River Consolidated Coal & Coke Co. and the Diamond Coal Co., the heaviest shippers on the river, are holding out against the union engineers who on Jan. 1 demanded an increase in salary from \$100 a month and board to \$125 a month and board.

Birmingham, Ala.—Chief Mine Inspector Nesbitt has announced the successful candidates for state mining certificates for the first- and second-class mine foreman and fire bosses in the examinations held Jan. 20 to 22. In the first-class foreman's list William Drury took first place with an average of 91. William Chase and William Mulholland taking second and third places. Among the first class fire bosses, J. Y. Malone and Edgar McElreath tied for first place. U. West made the highest mark for second-class mine foreman. The percentage of failures was comparatively low. Many of those who would have applied for certificates were not allowed to do so because they had not had actual experience with safety lamps in the mines. Without this knowledge, other qualifications are of no avail.

Coal Trade Reviews

General Review

Slowing down in operations and lower prices characterize the anthracite market; consumers have full supplies and demand light. January bituminous trade considered the worst in years. Accumulations the rule and much coal on demurrage. Producers have lost their former confidence and even strike scare fails to stimulate business.

The stimulating effect of the recent cold snap has died out, and the anthracite trade has again relapsed into its former lethargy. The heavy production and light consumption, due to the unseasonable weather, has resulted in such large accumulations that operators are being forced to restrict production for the second time this year—a most unusual procedure in the mid-winter season. The dealers are filled up on all sizes with the possible exception of some of the steam grades; there is only a scattering demand, and orders are promptly filled. The independents are endeavoring to force the market with substantial concessions, particularly on egg coal.

The bituminous market is under equally heavy pressure. Accumulation at all points is the rule, and the spot market is much depressed with substantial concessions on the regular circulars being freely offered. The January trade is considered by some as the worst for that month, in the history of the industry. Even under heavily curtailed operations, the producers are experiencing much difficulty in placing their tonnage. As a rule, the movement on contracts continues fair, but some suspensions have even been noted in this business. Consignment coal is appearing in all parts of the country, which is tending to make buyers cautious.

The Pittsburgh district reports little inquiry with prices still being cut, and operations reduced to 50% of full rated capacity. The opinion prevails among many that there will be a suspension of some duration beginning April, which will be followed by a short but active and profitable summer trade. The new January circular in Ohio has been fairly well maintained, but the consistently warm weather has severely shaken the confidence of the sellers. The possibility of a suspension in mining Apr. 1 is doing little to stimulate the market, a great many manufacturers, working under restricted operations, finding it possible to accumulate stocks on their regular requisitions.

The accumulations at Hampton Roads last week were the highest for some months, while the demand from all sources was particularly light, although prices continue holding moderately firm with some agencies even short of tonnage for immediate loading. The demand in the Southern markets continued far below the average for this period, some inquiries on contracts being the only favorable feature in that market.

Although there has been an occasional cold snap in the Middlewest, the more or less continued mild weather has produced almost summer-like conditions in the coal trade. Prices have reacted to new low levels, and even the strike scare has failed to help matters. Quotations on contracts are holding moderately steady, but there is considerable shading on spot business. It is stated that the operators will go into convention with the miners, with instructions to effect a settlement at any cost. There is also a strong movement to continue operations pending a settlement so that consumers feel relatively safe.

EASTERN MARKET

BOSTON, MASS.

Active campaigning for contracts already begun on Hampton Roads coals but buyers are expected to be slow responding. Low spot prices have unfavorable effect. Stocks large everywhere. Anthracite inquiry confined to odd sizes and buyers are conservative.

Bituminous—Preliminary canvassing for contract business on the part of some of the Pocahontas and New River agencies is causing considerable comment. Buyers especially are beginning to feel this will be an "easy" year and they are not much inclined to close business until they can get a better

line on spring developments. Practically all the Southern shippers are expected to make an aggressive campaign for contracts but it is probable that the season will be slow starting and further that it will spread over longer than usual.

Meanwhile the accumulations at the Virginia piers are still very much in excess of current requirements and this in spite of rigid curtailment at most of the operations. The spot market is considerably depressed and reputable coals have been offered more or less freely at a considerable discount from the \$2.85 basis. Further offerings of "market coal" for delivery inland have had an unfavorable effect on the market as a whole and particularly those buyers who might otherwise be disposed to come in early. Government and off-shore requisitions are few in number and even the large corporations are backward about accepting their full monthly quotas on contract. Outside of these factors that are pressed with coal to move there is, however, almost nothing doing on Pocahontas and New River in this territory at this writing.

Georges Creek shares the general apathy, and shipments are extremely light for the season. The demand for the higher grade Pennsylvania is still very quiet, with no significant change to report. Stocks are large in every direction.

Anthracite—There is only scattering demand, and that for odd sizes to piece out the next month or so. Few dealers have courage to buy further ahead as February weather is uncertain. The slow movement of barges is inducing some to be more forehanded, but there is almost no life to the trade.

Water Freights are somewhat firmer on account of the storms that have prevailed; 75c. is now the minimum rate for steam or barge tonnage from Hampton Roads to Boston, but inquiry is confined to a few large shippers.

Current wholesale quotations are about as follows:

	Clearfields	Cambria Somerset	Georges Creek	Pocahontas New River
Mines*	\$0.95@1.55	\$1.25@1.60	\$1.67@1.77	
Philadelphia*	2.20@2.80	2.50@2.85	2.92@3.02	
New York*	2.50@3.10	2.80@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				\$2.80@2.85
Boston†				3.50@3.67
Providence†				3.58@3.72

*F.o.b. †On cars.

NEW YORK

Full stocks of anthracite, both at tidewater and all-rail. Operations heavily curtailed and individual prices on domestic grades decline sharply. Bituminous also at a low ebb. Much consignment coal reported and practically no spot business being negotiated.

Anthracite—The New York hard-coal trade is unchanged but slower if anything. As is to be expected in a weather market, such as now prevails, the dullness is accentuated on the domestic sizes. These are all in poor demand, the trade being full up both all-rail and at tidewater. Egg coal is probably the heaviest and if the unseasonable weather continues, and there is no curtailment in mining, there will be considerable stocks of this grade carried over. Stove coal is not in such excess supply.

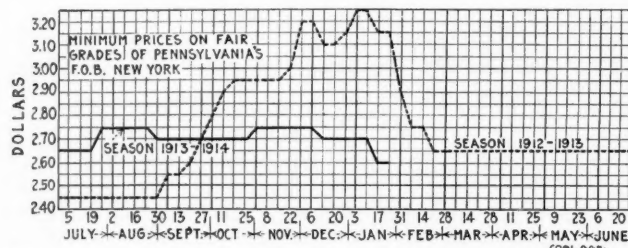
Curtailement in mining has become generally established throughout the region. Nearly all the large companies are restricting operations to a greater or less extent while individuals are said to be down to a basis of about three days per week. Since the consumption of the steam sizes is not affected so much by the unsatisfactory weather conditions, there is somewhat of a shortage of these due to the curtailed operations. Rice, barley and No. 2 buckwheat are particularly short, but all the finer grades are in rather active demand as the output of these is much reduced by freezing weather.

We quote the New York market considerably off from last week, as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	\$5.00	\$4.50@5.00	\$5.05	\$4.45@4.95
Egg	5.25	5.25	5.30	5.20
Stove	5.25	5.25	5.30	5.15@5.20
Chestnut	5.50	5.50	5.55	5.35@5.45
Pea	3.50	3.55	3.50	3.45
Buckwheat	2.75	2.75	2.70@3.45	2.25@2.70
Rice	2.25	2.25@2.35	1.95@2.20	1.90@2.20
Barley	1.75	1.75@1.80	1.70	1.50@1.70

Bituminous—The soft-coal situation is even worse than anthracite. Nearly everyone seems to be stocked up to the limit and quite a little demurrage coal is being reported. Operations in Pennsylvania are about 75% capacity and business is confined mostly to contracts, requisitions on which are fair. Companies who failed to get their production covered are the principle sufferers from the depression.

The outlook is mostly conceded to be pessimistic. Railroads are stocked up with full supplies. Coal is offered



down to 85 to 90c. and even the possibilities of a more or less protracted suspension in mining after Apr. 1 has failed to have any reviving influence on the situation. There are some optimists in the market, however, who feel that the buying has been so light recently that consumers stocks must be down to a low point, and this together with the possibility of labor troubles, will start a sharp buying movement about the middle of February.

We quote the New York market still weak but with the price base unchanged as follows: West Virginia steam, \$2.60 @ 2.75 good grades of Pennsylvania, \$2.75 @ 2.85; best Miller Pennsylvania, \$3.10 @ 3.20; George's Creek, \$3.15 @ 3.25.

PHILADELPHIA

Zero weather stimulates demand for hard coal but conditions still slow. Mining restricted and the demand continues rather light. Bituminous market fails to rally in sympathy.

Anthracite—The local hard-coal market last week was more encouraging. The appearance of real winter weather early in the week stimulated the demand and increased consumption to a greater extent, even more than the most optimistic operator or dealer anticipated. The change was badly needed as the operators were contemplating half-time operations but conditions have now assumed a better aspect.

The continuous large shipments and the decreased consumption, because of the mild weather, had been seriously felt here for several months. Throughout the city yards and cellars were filled with coal that has not been required. The result was that since the middle of November there has been an exceedingly slack trade with the usual concessions in prices. Now the trade feels that it has come into its own at last and that normal activity is to be expected by the end of this month.

Bituminous—Conditions have not altered in the bituminous trade. Some coal is moving on contracts but new orders are scarce. Cheap grades can be bought at from 90c. to \$1 but good grades are bringing \$1.25 @ 1.40.

BALTIMORE, MD.

Low prices for soft coal continue. Demand not active and suspension of contract obligations in evidence. Retail hard-coal market fairly good.

The entirely unsatisfactory period of low-priced soft coals continues in this market. Demand is the worst for a close of January that has come to the trade for some years. All of the mining centers near-by are feeling the effects of this condition. Some of the largest mines are only working about two days per week. Even at that there is trouble in disposing promptly of the coal produced. One of the great troubles of the trade just now is the suspension of contracts.

Prices to the trade in West Virginia do not give any great encouragement. Slack was quoted down to 65 and 70c., and three-quarter gas around 75 and 80c. West Virginia steam coals were again quoted around 90c. West Virginia low-grade fuels were bringing from 90c. to \$1, while best grades were offered from \$1.20 to \$1.25.

The anthracite coal trade is experiencing but a fairly good period. The weather as a whole is below the seasonal average, despite the occasional colder spells, and household trade has not been quite up to the mark. The much talked of merger of some twenty of the largest coal concerns here is now reported to be progressing favorably, and an announcement of its consummation may be made in the next couple of weeks.

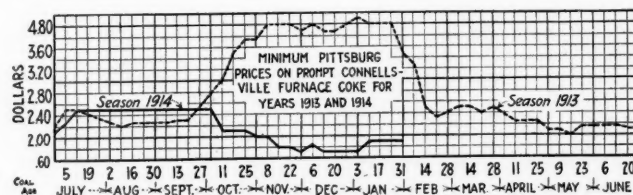
In export lines fairly good progress is being made. Mexican shipments have been resumed, although they are not as heavy as they should be. The month of January, however, is expected to show a considerable tonnage moved from this port to foreign points.

CENTRAL STATES

PITTSBURGH, PENN.

Mine operations continue light, about 50% capacity, with prices being cut on prompt. Miners in convention at Indianapolis. Connellsville coke market quiet, with some operators showing low production.

Bituminous—Mine operations continue on a very restricted scale, little, if any, above 50% of full mine capacity. Many mines are closed entirely, while a few are operating at nearly normal. Prices continue to be cut by a number of sellers except in the case of slack, which is bringing \$1 @ 1.15, or above list. While there is little inquiry regarding contracts, full list prices would doubtless be quoted, and we repeat the list as follows: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25. mine-run, \$1.30; ¾-in., \$1.40; 1¼-in. steam, \$1.50; 1¼-in. domestic, \$1.55, per ton at mine, Pittsburgh district. While the exact demands of the miners in connection with a scale for the new period beginning Apr. 1 are not known, it is well understood that the convention at Indianapolis will demand advances, together with the establishment of a straight mine-run rate, instead of a rate on screened coal with a differential for mine-run.



Connellsville Coke—The market has been quiet, but it maintains some show of strength. Prompt furnace coke is not openly offered below \$1.90, though it is reported that one furnace interest, which refused to pay above \$1.75 for any coke for this year, has picked up various odd lots at not over this figure. There is nothing doing by way of contracts, and two or three inquiries recently put out do not seem to have led to business. Several consumers covered for January only and their inquiries for February are expected within a few days. Some of the operators who held out for the full \$2 price are showing extremely light operations. We quote: Prompt furnace, \$1.90; contract furnace, \$1.85 @ 2; prompt foundry, \$2.40 @ 2.65; contract foundry, \$2.40 @ 2.65, per ton at ovens.

BUFFALO, N. Y.

Some improvement in the bituminous trade. Steady winter weather will soon restore activity. Surplus coal about gone. Anthracite more quiet. Coke stronger.

Bituminous—The bituminous trade in general agrees that the demand is better than it was a month or even a week ago. Both here and in Canada the consumer is beginning to take an interest and if the weather should become cold there will be plenty of business before long.

It is generally thought that the miners will go out at the end of March and as a rule the operators will not object. Indications point to a suspension of considerable length, followed by a short summer season with a good, paying trade. The feeling in the Philadelphia market, which depends largely on coal from nonunion mining districts is said to be more confident, but the cue of the operators is to let the miners do what they like in the matter. If they elect to go out they can do so and the suspension will be allowed to last till the market is out of surplus coal. Quite often this plan is not carried out very fully, but there seems to be every reason for it now.

Coke—There is also an added firmness in the higher grades of coke, the best foundry output being quite scarce in most markets, due both to restricted output and to a better demand. The lower grades are, however, plenty enough and promise to remain in surplus for some time. Prices are based on \$4.50 for best 72-hr. foundry, with a slight upward tendency.

Anthracite—There is no stir in the anthracite trade, one reason being the heavy overstocks and the short duration of the occasional cold snaps. This trade is more affected by weather conditions than others and the fact that the winter in the West and Northwest is even milder so far than it is East has a distinctly depressing effect. All anthracite mines are running on part time, and still there is some unsold coal from independent companies reported here and there. No premium has been obtained over the regular circular this season.

TOLEDO, OHIO

Domestic market was slightly stimulated by lower temperatures. Operators and dealers are still optimistic. Prices are holding up better than was anticipated. Little track coal and traffic moving well.

A briskness in the demand for domestic is noted as the result of some real winter weather in Toledo. Despite the return of milder temperatures toward the end of the week operators and dealers are still confident and the weather bureau has predicted continued lower temperatures. A strong demand for Pocahontas egg is evident and dealers need orders for lump coal in order to meet the demand for egg. Pittsburgh No. 8 is also strong.

Owing to curtailment at various factories steam coal is in light demand. Three of the sugar plants also shut down last week and this threw an extra tonnage on the market. One comforting fact in the local situation is that prices are holding up wonderfully well. Two weeks ago it seemed as though this would not be the case but the scarcity of various grades at the mines has served well to pull the former firm prices back to normal.

COLUMBUS, OHIO

Little change in the local trade reported during the past week. Weakness still apparent in both steam and domestic. Mining operations are not active. Little stocking reported as yet.

Continued slowness has characterized the coal trade in Ohio during the past week. The mild weather has affected the domestic trade adversely and dealers are not placing orders extensively. The steam trade is also quiet and on the whole the market is completely at the mercy of weather conditions. The price list of the middle of the month is being well maintained, although there are some instances of cutting to force trade.

Contrary to expectations there is little being done by steam users toward stocking up to guard against a suspension after Apr. 1. Manufacturing plants are accumulating stocks from their usual requisitions which are not being consumed because of the warm weather and slack orders. Some railroads which do not penetrate any coal fields are stocking up some, but on the whole most of the consumers are not worrying over the future.

In the domestic trade dealers are loath to place orders, even for future delivery. The continued mild weather has interfered with trade seriously and many of them have let a number of wagons go into other business. Small orders are the rule and the larger users who laid in their supply in the fall have not been compelled to place second orders. There is some demand for the fancy grades, but even these are weak.

Production has increased very slightly. In the Hocking Valley and Pomeroy Bend the output is estimated at 50% normal. In the strictly domestic fields it is only about 40% of the average, but eastern Ohio is increasing, reports showing about 55 to 60%.

What steam contracts expire at this time are being renewed without a great deal of trouble. The prices generally are the same as prevailed in 1913.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	\$1.50 @ 1.45	\$1.50 @ 1.45	\$1.50 @ 1.40
3-4 inch.....	1.35 @ 1.30	\$1.20 @ 1.15	1.35 @ 1.30	1.35 @ 1.25
Nut.....	1.25 @ 1.20	1.30 @ 1.25	1.25 @ 1.20
Mine-run.....	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack..	0.80 @ 0.75	0.85 @ 0.80	0.80 @ 0.75
Coarse slack.....	0.70 @ 0.65	1.00 @ 0.95	0.75 @ 0.70	0.70 @ 0.65

DETROIT, MICH.

Some indications of industrial improvement had a mildly stimulating effect, but the market still rules dull at a discouraging low level. Demand fails to materialize as a result of the strike talk. Negotiations on contracts for the new year.

Bituminous—There is some improvement in new business, but track and spot coal remain about the same with perhaps a decrease in the supply of cheaper grades. Interest is beginning to focus on the making of new contracts, and there are rumors of an advance of 10c. per ton over last year's figures. It is doubtful, however, if operators will succeed in maintaining an increase of even 5c. per ton.

Anticipated labor troubles, Apr. 1, have failed to create any renewed activity at the mines. Some indications of improvement in general industrial manufacturing had a mildly stimulating effect, but the reports of an almost unprecedented surplus of idle coal cars was a weakening factor in the situation. The domestic market continues dull and uninteresting at a discouraging low level. The colder weather of last week created some demand, but coal came in, in unlimited quantities to meet it. Local coal men have hopes, however, of a profitable season this year.

Anthracite—The supplies of hard coal exceed requirements, and it is now almost certain that stocks will be carried over into the spring.

Coke—Coke is slightly more active, local ovens which have been closed for the past month having gone in blast. Connellsville is quoted at \$2.25, Solvay at \$3.25, and gashouse at \$3 f.o.b. ovens.

HAMPTON ROADS, VA.

Coal accumulation slightly above normal. Norfolk & Western Ry. makes record day's dumping. Some shippers still short and prices holding remarkably well.

In consequence of only a fair movement from tidewater the accumulation of coal is somewhat larger than it has been for some months. The demand from all sources has been particularly light during the entire week. In addition to the falling off in cargo vessels there has also been a decrease in the arrival of bunker steamers. The falling off in the latter is probably due to light export shipments from the Southern ports. Although there is more than the normal supply on hand some of the largest shippers are short of coal for tonnage actually in port.

Even with the light demand it is impossible to find that there has been any cut in prices. Some spot sales have been made during the week but it is impossible to ascertain at what prices. It is not believed, however, that they were made below the regular circular.

Notwithstanding the light shipments from Hampton Roads the Norfolk & Western Ry. on Jan. 19, had the heaviest day's dumping ever made over the piers of that road at Lamberts Point. Five barges and a like number of cargo steamers were loaded with 832 cars, a total of 36,692 tons. This is 2834½ tons more than was dumped on Dec. 22, 1913, the largest previous record. The total dumpings for December 22 was 33,857½ tons.

LOUISVILLE, KY.

Consumption abnormally low and few dealers are inclined to buy. Large surplus of railroad cars. Mine operations much restricted. Price cutting becoming general.

The coal trade is still facing an almost unvarying continuance of mild weather, one or two days of comparatively low temperatures early in the week not being sufficient to affect the market appreciably. This has made domestic coal increasingly difficult to move, inasmuch as the stocks accumulated during the past month still remain much too large. Consumption has been at an abnormally low point and domestic users are not inclined to buy in view of the approach of the second month of the year and the last of the winter.

The present excellent car supply, and the rapidity of the movement are largely due to the small volume of business as compared with a normal season. It is reported that many mines are only working two days a week, while other operations have stopped entirely, the supply of coal already in the hands of the trade being excessive. The high stage of the Ohio for the past month has enabled the river companies to replenish their holdings considerably, so that there is a large supply of coal in all quarters with little demand.

Quotations on the best grades of eastern Kentucky block are made at \$1.85, but this is shaded to effect a sale. It might be said that there is practically no market for the domestic grades, and hence no figure which would represent a fair average price. The steam market is somewhat more satisfactory, the supply being larger than the limited operations would seem to provide, while prices are fairly good, considering the general state of the market. For the first grades 85c. is about the average figure, while for second qualities and western Kentucky screenings 15 to 20c. lower is the market.

SOUTHERN AND MIDDLE-WESTERN

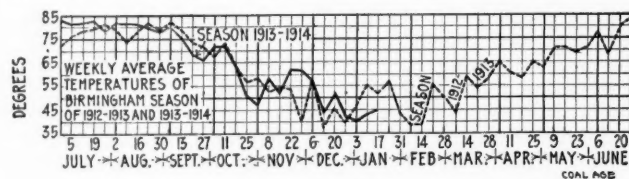
BIRMINGHAM, ALA.

Very little change in coal market. Furnace and foundry coke still quiet and blacksmith coal satisfactory. Large sales of pig iron with prices slightly below \$11. Car situation improving.

From the indications about ten days ago, it seemed that the coal market was picking up, but the past week has brought little improvement, either on lump or steam coal, and while the demand is slightly better on both grades than it was two weeks ago, still, it is far below the average for this season of the year. As a rule, all mines are being rushed to their full capacity to fill lump orders, but the operators are experiencing some trouble in keeping their output moving

regularly. The steam trade is not in a much better condition, though the past week has brought out inquiries for contracts amounting to approximately 50,000 tons.

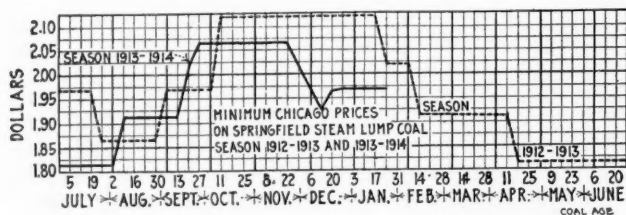
The conditions generally are not satisfactory. Furnace and foundry coke are still quiet, though prices are holding up. Blacksmith coal is moving in about its normal tonnage. Furnaces report large sales of pig iron, one operator reporting approximately 25,000 tons sold for the week, the base price being slightly below \$11 for 2 Foundry f.o.b. Birmingham. The car situation has improved to some extent, and little trouble is being experienced for want of equipment.



CHICAGO

A continuation of warm weather and light buying has caused some prices to reach new low levels. Steam users are not in the market except for comparatively small amounts. A renewal of activity in the southern Illinois fields has been noted.

Lack of usual buying by consumers has been a noticeable factor in the anthracite trade. Consumption in apartment houses and other dwellings is about normal, but there has been a marked falling off in other business. Easier conditions prevail so far as smokeless is concerned. It is not difficult to obtain a lot of mine-run from small producers at \$1.25 a ton, although the larger operators are still demanding \$1.40, the mines. The demand for lump and egg is fairly good, the market being firm at from \$1.85 to \$2.25, the mines. The circular price of Hocking remains at \$1.75, although there are many sales at \$1.50 for the best grade.



The attitude of many concerns in restricting expansion until they can ascertain what Congress proposes to do on the subject of anti-trust legislation is having an important effect on the steam trade. Smaller concerns are following their example and the result is slow business.

An increase in activity has been noted in the southern Illinois fields. The major producers of Franklin County coal are selling lump and egg at \$1.65@1.75. The action of the railroads and some other large consumers of steam coal in making purchases for storage purposes has had a beneficial effect on the market. A reduction of 5c. a ton in Springfield steam lump and mine-run and a cut of 10c. in the price of screenings has been recorded. Indiana operators report light buying and few signs to indicate that business will be accelerated to any marked degree in the near future. The current needs in furnace and foundry coke are being taken care of by small purchases. Few contracts are being closed. Cartersville producers are selling lump, egg and No. 1 washed at \$1.50 to \$1.75.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump.....	\$2.32	\$2.55@2.80	\$2.27	
Steam lump.....	1.92	2.55@2.80	1.97	
Egg.....	1.32	2.30	1.87	\$3.90@4.30
Mine-run.....	1.47	1.75	1.47	3.30@3.45
Screenings.....				

Prices quoted for Harrisburg coal are: Domestic lump and egg, \$2.55@2.85; steam lump, \$2.25; mine-run, \$2.25; screenings, \$1.75; No. 1 nut, \$2.55@2.85; No. 2 nut, \$2.55.

Cartersville prices are: Lump, egg and No. 1 washed, \$2.55@2.85; No. 2 washed, \$2.55.

Coke—Connellsville, \$5.25@5.50; Wise County, \$5@5.25; byproduct, egg, stove and nut, \$4.90@5; gas house, \$4.65@4.75.

INDIANAPOLIS

Mild weather a check to good business. Dullest January on record at the mines. Brief spells of cold weather prevent demoralization, but some bargains being offered. Miners making about half-time.

Continuation of mild weather tends to make conditions dull in the coal industry. It would be unprecedentedly so, if there were not brief interspersions of cold weather that

make it necessary for the domestic consumers to keep an ample supply on hand. Operators say that, taking the season as a whole, the 21,000 miners of the state have not made better than half-time. They cannot recall a January when mining operations were so slow. Better reports are coming from the iron and steel industry, however, and this means an improvement in the coal mining industry.

There has been a check to the buying caused by fear of a suspension of work after Mar. 31, when the present wage contract runs out. Operators and miners have both passed resolutions opposing any shut-down during wage negotiations, no matter how prolonged these may be. The final action concerning this, however, is in the hands of the interstate joint committee that meets in Philadelphia, Feb. 3. The feeling is general that there will be no material change in the wage schedule and some Indiana operators are so certain of this that they are trying to make yearly contracts on the same wage basis as last year. The largest consumers also seem to be taking it for granted that if there is a suspension it will be a short one.

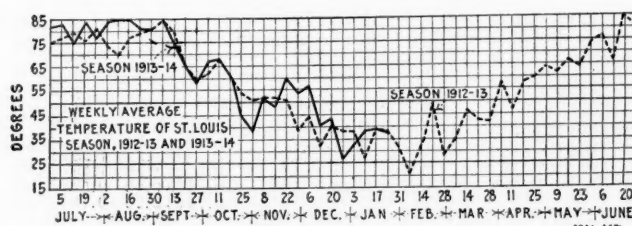
Mines that do a large part of their total business on contracts are holding prices steady but some bargains are being offered at retail, probably indicating concessions made by some mines. Several yards have cut prices 25c. all down the line and on some coals 50c. a ton. One of them offers "good, clean Indiana lump, best quality," at \$2.90 a ton, as against \$3.50 the general price, and Hocking lump at \$4.20, as against \$4.75.

ST. LOUIS

Market conditions continue adverse, owing to mild weather, and failure of big steam users to put in usual storage supplies. Colder weather predicted which it is hoped will bring better conditions. Rumors from the strike zone.

Market conditions here continue in practically the same rut as for the past several weeks. Continued warm weather has kept business in perhaps a worse condition than it could possibly be in the middle of the summer. Usually at this period of the year, preceding the termination of a wage agreement between the miners and the operators, there is an unusual amount of storage coal bought, but there is little if any being purchased at this time, principally because the railroads have been stocking up gradually for several months, on account of the attractive prices.

Manufacturers, as a rule, are not expecting at the present time to place for any great amount of storage coal. They are under the impression that the miners and the operators will accede to the demands of certain railroad interests. It seems that one of these demands is that operators on certain railroads have been instructed by the road's officials to do everything possible to prevent a suspension and they will go to the convention instructed this way. On the other hand, the small operators would welcome a suspension of from two to three months. It would bring good prices now and enable them to shut down during a period when there is no business under the most favorable conditions.



Locally, the screenings market has dropped off and seems to be getting lower, and strange to say, the same applies to the screened sizes. All these latter have dropped during the past week, and there is no immediate indication that there will be any advance soon, although there now seems to be a likelihood of St. Louis getting a little real winter weather.

Anthracite, smokeless and coke are moving slow; the first is usually a demurrage proposition at East St. Louis.

The prevailing market is:

	Cartersville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump.....				\$0.90@1.00
3-in. lump.....				
6-in. lump.....	\$1.25 @ 1.50	\$2.25	1.50	1.15@1.25
Lump and egg.....	1.85 @ 2.15			
No. 1 nut.....	1.15 @ 1.40			
Screenings.....	0.75 @ 0.80			
Mine-run.....	1.10 @ 1.20			
No. 1 washed nut.....	1.60 @ 1.75	2.25	1.60	
No. 2 washed nut.....	1.25 @ 1.35		1.25	
No. 3 washed nut.....	1.15			
No. 4 washed nut.....	1.05			
No. 5 washed nut.....	0.50			

KANSAS CITY, MO.

Operations at the mines much restricted. Market dull and hinging entirely on weather conditions. Prices resisting any tendency to decline.

Remarkably variable weather has prevented the coal operators from making much of a gain during the past week. Arkansas mines have operated only about half-time. Those in Kansas and Missouri have done a little better, as a rule, running about four days. The weather, the key to the situation, has been inconsistent, providing extreme cold one day and balmy breezes the next. The market has been steady, but far from strong.

OGDEN, UTAH

Moderate weather prevails and mines idle because of no orders. Operators believe season's demand for coal is over and are putting mines on half-time basis. Freight rate reduction to Northwest. Shipments to sugar factories discontinued.

During December 1913 the operators had a hard time to keep orders coming in fast enough to take care of the production. January 1914 opened up weak and it has been a continual fight to dispose of the output. Many of the operators kept their mines running in order to hold the men, thinking January would bring some winter weather, and increase the demand for coal; however by January, 15, it was the general impression that such would not be the case. Reports from Portland, Walla Walla and Spokane show that weather conditions are above normal and that these points have had practically no winter weather. One report states that the rose bushes in the parks at Spokane show indications of budding.

All of the sugar factories have completed the season's run and shipments of slack and steam coal have been discontinued. This has caused a surplus of slack coal at the mines. There is also a surplus of nut coal and prices have been lowered at times. A permanent reduction of 25c. on nut for shipment to Nebraska was established early in January in order to move the surplus.

The Union Pacific, Oregon Short Line and Oregon, Washington Railroad & Navigation Cos. announced a reduction in the freight rate on coal from Rock Springs effective Jan. 8, to points northwest of Huntington, Oregon. This reduction was made necessary by the commission's reduction in the freight rate on coal in the Sheridan district of northern Wyoming. These coals originate on the C. B. & Q. R.R. and come in direct competition with Rock Springs coal in Washington, Oregon and northern Idaho. The reduction in the Rock Springs rate varies from 25c. to 90c. per ton.

Present quotations are rather weak and unsteady on the following basis:

	California	Nebraska	General
Lump.....	\$3.00@3.50	\$3.00	\$2.75
Nut.....	2.50@3.00	2.00	2.25
Mine-run.....	1.85	1.85	1.85
Slack.....	1.00	1.00	1.00

PRODUCTION AND TRANSPORTATION STATISTICS

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for December and the twelve months of 1912 and 1913 in short tons:

	December		Twelve Months	
	1913	1912	1913	1912
Anthracite.....	1,012,125	1,036,717	10,711,335	10,312,348
Bituminous.....	4,354,729	4,271,702	51,526,267	46,434,187
Coke.....	880,962	1,242,882	13,892,825	13,371,345
Total.....	6,247,816	6,551,301	76,330,427	70,117,880

NORFOLK & WESTERN

The following is a statement of the tonnage shipped over this road during December, 1913, and the twelve months, as compared with corresponding periods of 1912 in short tons:

	December		Twelve Months	
	1913	1912	1913	1912
Coal				
Tidewater, foreign.....	84,083	150,886	1,343,311	1,542,950
Tidewater, coastwise.....	258,216	331,829	3,583,283	3,805,847
Domestic.....	1,353,189	1,353,108	17,716,575	18,543,672
Coke				
Tidewater, foreign.....		575	52,762	31,082
Domestic.....	134,763	116,730	1,416,856	1,499,302
Total.....	1,832,251	1,953,128	24,112,787	25,422,853

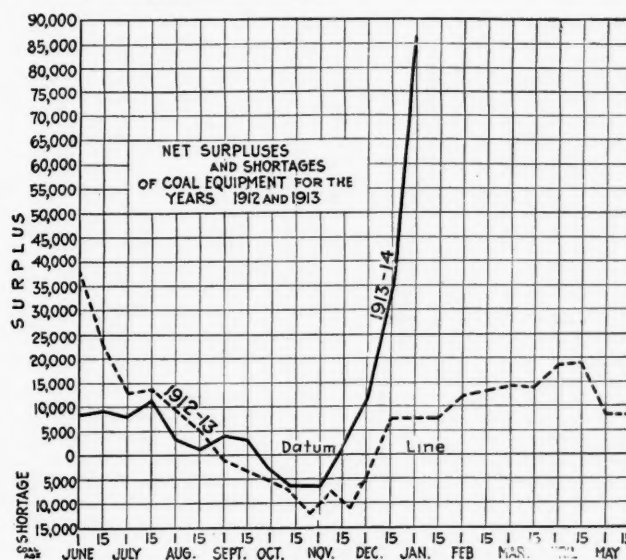
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Jan. 15, as follows:

	Surplus	Shortage	Net*
New England Lines.....	633	0	633
N. Y.; New Jersey, Del.; Maryland; Eastern Penn..	22,362	350	22,012
Ohio; Indiana; Michigan; Western Pennsylvania...	40,065	109	39,956
West Virginia, Virginia, North & South Carolina...	4,419	254	4,165
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida...	7,347	55	7,292
Iowa, Illinois, Wis., Minn.; North & South Dakota...	3,609	15	3,594
Montana, Wyoming, Nebraska.....	460	0	460
Kansas, Colorado, Missouri, Arkansas, Oklahoma...	2,770	0	2,770
Texas, Louisiana, New Mexico.....	468	6	462
Oregon, Idaho, California, Arizona.....	5,016	0	5,016
Canadian Lines.....	0	0	0
Total.....	77,149	789	86,360

	Sept. 15	Oct. 1	Oct. 15	Nov. 1	Nov. 15	Dec. 1	Dec. 15	Jan. 1
Surplus.....	8,714	7,953	6,614	6,720	10,520	17,621	36,435	72,535
Shortage.....	7,731	10,393	12,502	12,595	8,477	5,095	2,295	57
Net*.....	983	2,440	6,488	5,875	2,043	12,526	34,140	72,478

*Bold face type indicates a surplus.



FOREIGN MARKETS

GREAT BRITAIN

Jan. 16—The position is unchanged, buyers being still able to purchase upon easy terms for prompt loading, and as regards forward shipment, inquiries are being held off the market. Outputs are very heavy.

Quotations are approximately:

Best Welsh steam.....	\$4.56	Best Monmouthshires..	\$4.17
Best seconds.....	4.44	Seconds.....	4.05
Seconds.....	4.26	Best Cardiff smalls....	2.64
Best dry coals.....	4.56	Seconds.....	2.46

The prices for Cardiff coal are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both net, exclusive of wharfage, and for cash in 30 days.

BELGIUM

Belgium imports and exports for 11 months ended November, 1912 and 13 were:

	Imports		Exports	
	1912	1913	1912	1913
Coal.....	8,116,243	7,409,763	4,498,231	4,652,783
Coke.....	1,032,131	860,784	1,013,221	923,206
Briquettes.....	430,612	391,744	580,835	578,752

COAL FREIGHT DECISIONS

Suspension Docket No. 242—Engine-switching charges

Proposed increase in rates on interstate shipments of coal from Chicago, Ill., to Ravenswood, Ill., and reduction of amount of absorption on such shipments by line carriers found not to be justified and suspended tariffs required to be withdrawn.

Financial Department

Lehigh @ Wilkes-Barre Coal Co.

This company reports for the year ended June 30, as follows:

	1913	1912	1911
Rec., all sour.	\$20,628,564	\$18,742,623	\$16,879,575
Op. exp., tax, etc.	15,019,733	14,982,262	13,406,193
Dep. coal land fd.			
Net	5,608,831	3,760,361	3,473,382
Interest	724,690	814,390	814,390
Sinking fund	461,089	360,000	460,000
Surplus	4,423,051	2,485,971	2,198,992
Ded. to com. break. and deb. coal in stock			
Less feder inc. tax			17,193
Bal. surp.	4,423,051	2,485,971	2,181,798
Dividends	1,197,462	1,197,625	1,197,625
Refund. debt.			
Profit and loss	3,225,588	1,285,346	984,173

The number of tons of coal mined and shipped during the year was 5,189,221, an increase of 1,202,795 tons, and 541,559 tons were purchased, a decrease of 144,969 tons, as compared with the previous year. The tonnage sold was 5,678,373, an increase of 497,914 tons over previous year. The tonnage of prepared sizes sold, including lump, equaled 66.73%, and of pea and smaller, 33.27%.

The amount in the sinking fund for the consolidated loan on June 1, 1913, was \$1,426,829, of which all but \$641 cash was invested in interest-bearing bonds. The year before the amount in the fund was \$932,743.

President Baer says:

"The several leases under which the Parrish Coal Co. were operating on this company's property were to expire June 1, 1916. It was deemed advisable not to renew or extend these leases, and in order to properly conserve the company's property it was decided to purchase the property, improvements, equipment, etc., of the Parrish Coal Co., and possession was taken on Feb. 1, 1913.

"Under the statute applying to counties with a population of more than 300,000, the assessment of property in Luzerne County is no longer under the control of the county commissioners, but is placed in the hands of a board of assessment appointed by the court. This board has just completed its work, and has made a very marked increase in the value of property generally, particularly coal lands. This has necessitated further appeals, and, from present indications, it will be some time before an equitable basis of valuation on coal property is finally determined.

"On June 27, 1913, an act assessing a tax of 2½% of the value at the mines of coal prepared for market became effective. This company's tax under this act will be approximately \$375,000 per annum.

"To facilitate the movement of coal from tidewater to eastern points, the sea tugs and barges owned by the C. R. R. Co. of N. J. were purchased at an appraised valuation. The fleet consists of three tugs and fifteen barges, with a carrying capacity of 20,000 tons.

"In compliance with the decision of the Supreme Court of the United States in the matter of the so called 65% contracts, all of such contracts held by this company were at once cancelled, and no coal has since been purchased, except in special cases, in small quantities, of a particular size."

The balance sheet as of June 30, shows total assets \$37,805,911, an increase of \$947,321. The working assets total \$6,762,205 and current liabilities \$918,155.

At the annual meeting of the company, President George F. Baer and the directors were unanimously reelected. The board consists of George F. Baer, George F. Baker, Samuel Dickson, Edward T. Stotesbury, Andrew H. McClintock, Charlemagne Tower and Thomas A. Wright.

Taxes on Coal Bonds

The "New York Times Annalist" has prepared the accompanying data re taxes on coal bonds. Four definitions of status are used as follows:

- (1) **Free**, meaning that the corporation pays;
- (2) **Taxable**, meaning that the holder pays;
- (3) **Company has refused to pay**, which means generally

a debatable interpretation of the mortgage provisions by the corporation, and

(4) **Doubtful**, which means that the provisions of the mortgage are obscure and that interpretation is in suspense.

As a rule, corporations have been liberal in their interpretation of obscure provisions; a number have rather agreed to pay the tax than to dispute the point. The list follows, in the alphabetical arrangement of the Stock Exchange sheet:

Buffalo & Susquehanna Iron Co. 1st 5s,	June 1, 1932..	Free
Clearfield & Bituminous Coal Corporation 1st S. F. 4s,	Jan. 1, 1940..	Free
Colorado Fuel & Iron Co. Gen. S. F. 5s,	Feb. 1, 1943..	Taxable
Colorado Fuel Co. Gen. 6s,	May 1, 1919..	Taxable
Colorado Industrial Co. 5s,	Aug. 1, 1934..	Free
Consolidation Coal Co. 1st & Ref. S. F. 5s,	Dec. 1, 1950..	Free
Consolidated Indiana Coal Co. 1st S. F. 5s,	June 1, 1935..	Free
Continental Coal Co. 1st 5s,	Feb. 1, 1952..	Free
Grand River Coal & Coke 1st 6s,	Apr. 1, 1919..	Taxable
Jefferson & Clearfield Coal & Iron Co. 1st 5s,	June 1, 1926..	Taxable
Jefferson & Clearfield Coal & Iron Co. 2d 5s,	June 1, 1926..	Taxable
Kanawha & Hocking Coal & Coke Co. 1st 5s,	July 1, 1951..	Free
Pleasant Valley Coal Co. 1st S. F. 5s,	July 1, 1928..	Taxable
Pocahontas Consolidated Collieries Co., Inc. 5s,	July 1, 1957..	Free
Rochester & Pittsburgh Coal & Iron Co. (Helvetia) Purchase Money 5s	May 1, 1946..	Taxable
St. Louis, Rocky Mt. & Pacific Co. 1st 5s,	July 1, 1955..	Free
Sunday Creek Co. Coll. Trust 5s,	July 1, 1944..	Free
Tennessee Coal, Iron & R.R. Co. Gen. 5s,	July 1, 1951..	Free
Tennessee Coal, Iron & R.R. Co., Birmingham Div. 1st Cons. 6s,	Jan. 1, 1917..	Taxable
Tennessee Coal, Iron & R.R. Co., Cahaba Coal Mining Co. 1st 6s,	Dec. 1, 1922..	Taxable
Utah Fuel Co. 1st S. F. 5s,	Mar. 1, 1931..	Taxable
Victor Fuel Co. 1st S. F. 5s,	July 1, 1953..	Taxable
Virginia Iron, Coal & Coke Co. 1st 5s,	Mar. 1, 1949..	Taxable

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Jan. 24:

Stocks	Week's Range			Year's Range	
	High	Low	Last	High	Low
American Coal Products.....	84½	83	84½	84½	82½
American Coal Products Pref.....	105½	105	105	106	106
Colorado Fuel & Iron.....	33½	32	33½	33½	28½
Colorado Fuel & Iron Pref.....			155		
Consolidation Coal of Maryland.....			102½		
Island Creek Coal Com.....	48	47	48	48½	47
Island Creek Coal Pref.....	85	84	85	85	83½
Pittsburgh Coal.....	21½	19½	20½	21½	17½
Pittsburgh Coal Pref.....	90½	88	90	90½	86
Pond Creek.....	20½	19	19½	19½	18½
Reading.....	172½	168½	170½	172½	166½
Reading 1st Pref.....	88	87½	87½	88	87
Reading 2nd Pref.....	92½	90½	92½	92½	90½
Virginia Iron, Coal & Coke.....	46	45	46	46	40

Bonds	Closing		Week's Range		Year's Range	
	Bid	Asked	or Last	Sale	Range	
Colo. F. & I. gen. s.f.g. 5s.....	96½	Sale	93	96½	90	99½
Colo. F. & I. gen. 6s.....	104	106½	107½	June '12		
Col. Ind. 1st & coll. 5s. gu.....	80½	Sale	79½	80½	75	85
Cons. Ind. Coal Me. 1st 5s.....	76	79	76	Aug. '13	76	76
Cons. Coal 1st and ref. 5s.....	89	92	87½	Dec. '13	87	87½
Gr. Riv. Coal & C. 1st s.f.g. 6s.....			102½	April '06		
K. & H. C. & C. 1st s.f.g. 5s.....	91		92½	Dec. '13	91	98
Pocah. Con. Coll. 1st s.f.g. 5s.....	84½	85½	84	84½	85	87½
St. L. Rky. Mt. & Pac. 1st 5s.....	77½	79	77½	Jan. '13	73	80½
Tenn. Coal gen. 5s.....	101	Sale	100	101	96	103
Birm. Div. 1st consol. 6s.....	101½	103	101½	Jan '14	100½	103
Tenn. Div. 1st g. 6s.....	101½		101	Jan '14	100½	102
Cah. C. M. Co. 1st g. 6s.....	101		103	July '13	103	103
Utah Fuel 1st g. 5s.....						
Victor Fuel 1st s.f.g. 5s.....		84	80	May '13	79½	80
Va. I. Coal & Coke 1st g. 5s.....	94½	Sale	94	95	92	92

*For the full year 1913. †Sale involving less than 100 shares.

DIVIDENDS

Reading Co.—Regular quarterly dividends on the first preferred of 1%, payable Mar. 12 to holders of record, Feb. 24.

St. Louis, Rocky Mountain & Pacific Co.—Dividend No. 2 of ½% on the common stock, payable Feb. 15 to holders of record, Feb. 3 to 14.

Jefferson & Clearfield Coal & Iron Co.—Dividend of 2½% on the preferred, payable Feb. 16 to holders of record, Feb. 6.